

U.S. ATOMIC ENERGY COMMISSION / DIVISION OF TECHNICAL INFORMATION

Technical Books and Monographs





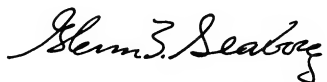
Foreword

The substantial research and development programs sponsored by the U. S. Atomic Energy Commission produce reactors, chemical processing plants, accelerators, and various other "hardware" and other end items. In addition to these tangibles, however, the programs generate knowledge vital to advances in science and technology.

This knowledge manifests itself in a large body of literature that continues to grow dramatically both in size and complexity. The Commission, recognizing the needs of scientists, engineers, and others throughout the world for information presented in readily usable form, has sponsored the publication of technical books and monographs for the past 17 years.

Indicative of the extent of the publication efforts are the 190 AEC-sponsored books published since 1947. These volumes, as well as the 29 books and the 27 monographs in press or in preparation are listed and described in this catalog.

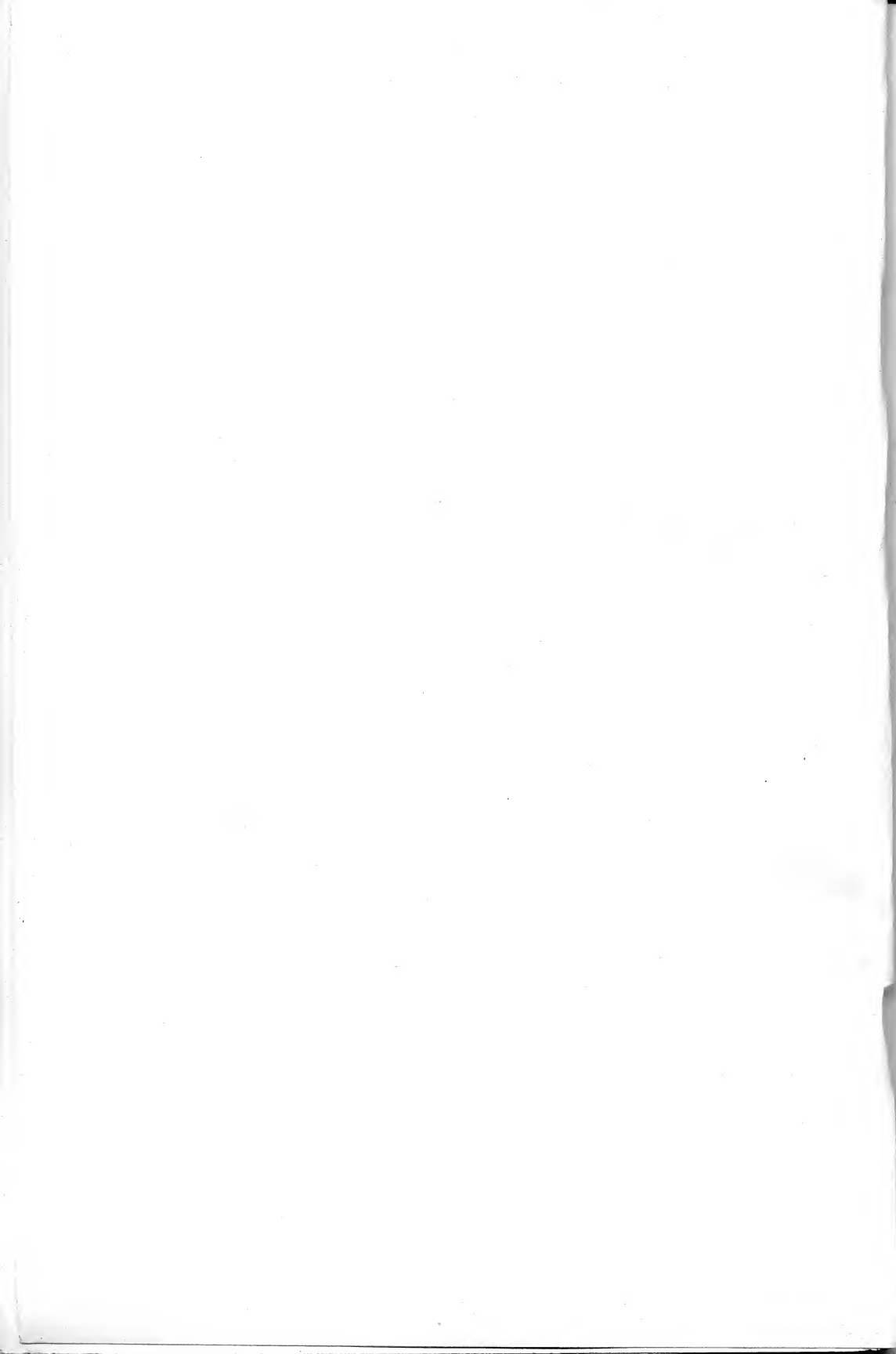
It is the Commission's sincere hope that the knowledge embodied in these books will contribute significantly to the international quest for peaceful applications of atomic energy.



Glenn T. Seaborg, *Chairman*
U. S. Atomic Energy Commission



First edition, April 1959
Second edition, June 1959
Third edition, January 1962
Fourth edition, July 1963
Fifth edition, September 1965



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SALES AGENCIES AND PUBLISHERS

Government sales agencies cited in this booklet are the Government Printing Office (GPO) and the Clearinghouse for Federal Scientific and Technical Information (Federal Clearinghouse). Requests for the purchase of publications from these two organizations should be addressed as follows:

Superintendent of Documents
U. S. Government Printing Office
Washington, D. C. 20402

Clearinghouse for Federal Scientific
and Technical Information
National Bureau of Standards
U. S. Department of Commerce
Springfield, Virginia 22151

The complete names and addresses of commercial publishers and sales agencies cited are listed on page 51.

PART I

Technical Books and Monographs Published

GENERAL REFERENCE*

■ ATOMIC ENERGY DESKBOOK

By John F. Hogerton, consultant to Arthur D. Little, Inc.

Reinhold Publishing Corp., 1963.

673 pp., 237 illus., $7\frac{1}{8} \times 10\frac{1}{8}$, \$11.00.

A one-volume encyclopedia prepared for engineers and scientists unfamiliar with atomic energy, as well as for those who are specialists in certain areas of this field. It is designed to be of equal value as a reference work for management, teachers, students, writers, and for interested laymen in general.

Entries, arranged alphabetically, range from a simple explanation to a treatment in depth.

CONTENTS: Fuel supply. Materials and elements. Radioisotopes and radiation. Miscellaneous reactor terms. Research and test reactors. Controlled fusion. Plants and laboratories. International. Miscellaneous topics and terms. Weapons. Biomedical. Civilian nuclear power—projects and concepts.

Army and naval reactor programs. Aircraft, space, heat, and maritime reactors. Administrative. Civilian nuclear power—general. Appendixes: index of contents; selected reading list; list of AEC depositories; list of membership of AEC advisory committees; list of stable and naturally occurring isotopes.

*The following abbreviated series titles are given in parentheses after their respective volume titles:

NNES—These are volumes in the National Nuclear Energy Series, written by scientists who performed research and development work on the atomic-energy enterprise under the Manhattan Engineer District and later under the AEC.

1955 Geneva Conference—These volumes were prepared by the AEC for the International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1955.

1958 Geneva Conference—These are U. S. Government presentation volumes for the Second United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1958.

■ ATOMIC ENERGY ENCYCLOPEDIA IN THE LIFE SCIENCES

Editor and major contributor, Charles Wesley Shilling, M.D., D.Sc., consultant to the USAEC.

W. B. Saunders Co., 1964.

474 pp., 263 illus., $7\frac{1}{4} \times 10\frac{1}{4}$, \$10.50.

A one-volume source book that combines the features of both a dictionary and an encyclopedia. It is developed for the life scientists, the generalist or the specialist, in specific areas of this discipline. The source book is designed to be of value for the medical and biological professions as a quick reference work for researchers, teachers, administrators, students, and interested laymen.

Entries, arranged alphabetically, vary from concise answers to journal-length articles.

CONTENTS: Radiation. Elements and radioisotopes. Radiation biology. Genetic effects. Somatic effects. Prevention and treatment. Accidents. Radioisotope uses. Health protection. Environmental contamination. Waste disposal. Instruments. Accelerators, reactors, power. Weapons. Administration, laboratories, and organizations.

■ ATOMIC ENERGY FACTS

U. S. Atomic Energy Commission, 1957.

216 pp., 44 illus., $7\frac{7}{8} \times 10\frac{1}{4}$. Available from GPO, \$2.00.

A handbook of AEC and commercial atomic energy activities for engineers and management. It is useful as a source book for teachers, writers, and others interested in atomic energy.

CONTENTS: Government and the atomic industry. The AEC: its organization and functions. Production of uranium and thorium. Power reactors. Fuel cycles. Reactor materials. Research reactors. Radioisotopes. Appendixes: basic principles of controlled thermonuclear program; categories of restricted data available to holders of access permits; depositories of AEC reports in the United States and abroad; bibliography of rules and regulations of AEC; power reactor data tables; data for representative research reactors; gamma irradiation facilities; catalog of materials standards.

■ ATOMIC ENERGY IN THE SOVIET UNION (Trip Report of the U. S. Atomic Energy Delegation, May 1963)

U. S. Atomic Energy Commission, 1963.

83 pp., 33 illus., $7\frac{3}{4} \times 10\frac{1}{8}$. Available from GPO, \$0.60.

A report by the U. S. delegation, headed by USAEC Chairman Seaborg, of an 11-day tour of Soviet nuclear installations in May 1963. This report contains observations on the work

being done and the equipment used at 14 Soviet sites, including 10 large scientific installations.

CONTENTS: Introduction. State Committee for the Utilization of Atomic Energy. Moscow State University. Lebedev Physics Institute. Chemical Physics Institute, Moscow. State Committee for the Utilization of Atomic Energy and Signing of Memorandum on Cooperation. U.S.S.R. Academy of Sciences. Kurchatov Atomic Energy Institute. Physical-Technical Institute. Scientific Research Institute of Atomic Energy Reactors. Khlopin Radium Institute. Ioffe Physical-Technical Institute. Yefremov Scientific-Technical Institute for Electrophysical Apparatus. VVPR-1 Nuclear Power Station. Physical-Technical Institute. Joint Institute for Nuclear Research. Site of the 70-Bev Proton Synchrotron. Conclusion. Appendixes: memorandum on cooperation in the field of utilization of atomic energy for peaceful purposes; tables of reactors and accelerators.

■ ATOMS FOR PEACE: U.S.A. 1958 (1958 Geneva Conference)

Edited by John F. Hogerton, Arthur D. Little, Inc.

U. S. Atomic Energy Commission, 1958.

162 pp., 186 illus., 9×12 . Available from GPO, \$4.50.

A pictorial survey, designed as a type of conducted tour, of the growing industrial and government atomic-energy installations in the United States.

CONTENTS: Research and development network. Power-reactor development. The production network. Research on thermonuclear power. Isotopes and radiation. Research for the future. International cooperation. Chronology.

■ ATOMS FOR THE WORLD

By Laura Fermi, historian for the U. S. delegation to the International Conference on the Peaceful Uses of Atomic Energy, Geneva, 1955.

Univ. of Chicago Press, 1955.

227 pp., 34 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$4.50.

An intimate and informative account for the layman, illuminating the hopes and plans of the participants, the problems encountered, the people involved, and the successful culmination of months of planning and work entailed in U. S. participation in the Conference.

CONTENTS: Afterthoughts. Evolution of an idea. The Office for International Conference. What is this atomic science? Geneva. On the opening day and after. A reactor flies east. Russian scientists in Geneva. The technical exhibits. Power. Radiation hazards. Plans and hopes. And so the end. Index.

■ THE EFFECTS OF NUCLEAR WEAPONS

Edited by Samuel Glasstone, consultant to the USAEC.

U. S. Atomic Energy Commission, February 1964 reprint of revised 1962 edition.

730 pp., 277 illus., $5\frac{7}{8} \times 9\frac{1}{8}$. Available from GPO, \$3.00; \$1.00 extra for plastic radiation computer.

A third edition of a standard reference work prepared by the Defense Atomic Support Agency, Department of Defense, at the request of the AEC. It updates information published in the 1957 edition and includes data on radiological, blast, and heat effects of nuclear detonations and on civil-defense planning.

CONTENTS: General principles of nuclear explosions. Descriptions of nuclear explosions. Air-blast phenomena. Air-blast loading and target response. Structural damage from air blast. Effects of surface and subsurface bursts. Thermal radiation and its effects. Initial nuclear radiation. Residual nuclear radiation and fallout. Radio and radar effects. Effects on personnel. Principles of protection. Appendixes: nuclear weapons safety and accident hazards; announced nuclear detonations; detection of nuclear explosions. Glossary. Index.

■ INTRODUCTION TO NUCLEAR SCIENCE

By Alvin Glassner, Argonne National Laboratory.

D. Van Nostrand Co., 1961.

213 pp., 70 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$3.75.

An outgrowth of an intensive course for high-school teachers developed by a committee of the Argonne National Laboratory Branch of the Scientific Research Society of America. Included are a brief review of atomic structure, discussion of the most recent detection methods and the known forms of radiation, description of the nucleus and nuclear reactions, survey of accelerators and reactors, and applications of nuclear science in chemistry and biology. The book is basic in content to narrow the gap between the training of the average high-school teacher and the current state of scientific knowledge.

This book is being translated into Spanish.

CONTENTS: Summary of curriculum. The nuclear atom. Detection of radiation. The nuclear particles. Natural radioactivity. The nucleus. The reactions of nuclei. High-energy accelerators. Reactors. Metallurgy of uranium. Processing of reactor fuels. The effects of radiations upon materials. Biology and radiation. Experiments. Metallurgy experiments. Index.

■ MANAGEMENT OF NUCLEAR MATERIALS

Edited by Ralph F. Lumb, Director, Western New York Nuclear Research Center, University of Buffalo (New York) and former Vice President, Quantum, Inc.

D. Van Nostrand Co., 1960.

516 pp., 180 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$16.50.

A source book that describes and discusses the acquiring, recording, evaluating, and presenting of quantity data necessary for the control of nuclear materials in all operations from mine to reactor. Specialists in various subject areas discuss control systems, accounting and inventory procedures, measuring techniques, and statistical methods.

CONTENTS: Basic management considerations. Raw materials. Materials processing. Reactor-fuel fabrication. Reactor operation. Recovery. Research and development facilities. Glossary. Index.

■ THE NEW WORLD, 1939/1946

(Volume I of A History of the United States Atomic Energy Commission)

By Richard G. Hewlett and Oscar E. Anderson, Jr., Office of the Secretary, USAEC.

Pennsylvania State University Press, 1962.

766 pp., 71 illus., $6\frac{7}{8} \times 9\frac{3}{4}$, \$5.50.

A history that presents the administrative and technical achievements of the Manhattan Project, the formulation of national and international policy on atomic energy, and the legislative origins of the AEC on a level understandable to the layman but still informative to the technical man.

CONTENTS: The AEC inheritance. Origins of the uranium project. Exploring the routes to the weapon. Establishment of the Manhattan Project. Race for the bomb: U²³⁵; plutonium. Early weapons work at Los Alamos. Anglo-American wartime relations. Production of the first weapons. Planning for military use. Postwar domestic and international control plans. Domestic legislation. The Acheson-Lilienthal report. The Baruch plan for international control. Establishment of the AEC. Sources. Appendixes: the McMahon bill; financial data. Index.

■ Third (1964) Geneva Conference Presentation Set

This four-volume set of books on nuclear energy was especially prepared for presentation to officials of the United Nations, the International Atomic Energy Agency, and the UN's specialized agencies, at the Third United Nations International Conference on the Peaceful Uses of Atomic Energy in Geneva, Switzerland. The books, dedicated to the late Presi-

dent John F. Kennedy, all contain a Foreword by President Lyndon B. Johnson. The price per volume is \$18.00; the price for the four-volume set is \$62.50.

□ EDUCATION AND THE ATOM

By Glenn T. Seaborg, USAEC, and Daniel M. Wilkes, University of California. McGraw-Hill, 1964.
150 pp., 141 illus., 9 × 9, \$18.00.

An analysis of the special problems of education, training, and dissemination of information resulting from recent scientific developments, combined with a description of programs the USAEC has developed to cope with these problems.

CONTENTS: Science education and the federal government. Direct AEC programs in education. The AEC and information. The atom in world affairs. Appendixes.

□ NUCLEAR POWER, U.S.A.

By Walter H. Zinn, Combustion Engineering, Frank K. Pittman, USAEC, and John F. Hogerton, Nuclear Consultant. McGraw-Hill, 1964.
201 pp., 271 illus., 9 × 9, \$18.00.

An interpretive survey of U. S. progress in developing and applying nuclear power, particularly for producing electricity.

CONTENTS: Central-station electric power generation. Photographic tour of U. S. nuclear power industry. Other nuclear power applications. Appendixes.

□ RADIOISOTOPES AND RADIATION

By John Lawrence, University of California, Bernard Manowitz, Brookhaven National Laboratory, and Benjamin S. Loeb, USAEC. McGraw-Hill, 1964.
133 pp., 192 illus., 9 × 9, \$18.00.

A selective presentation of U. S. progress in applying radioisotopes and radiation to medicine, agriculture, and industry.

CONTENTS: Medical diagnosis and research. Medical therapy. Veterinary medicine and animal husbandry. Agriculture. Destruction of bacteria in food and medical supplies. Synthesis of chemicals. Other isotope applications in industry. Some diverse uses.

□ RESEARCH, U.S.A.

By Albert V. Crewe and Joseph J. Katz, Argonne National Laboratory. McGraw-Hill, 1964.
217 pp., 273 illus., 9 × 9, \$18.00.

A selective account of U. S. progress in basic research related to atomic energy since the 1958 international conference in Geneva.

CONTENTS: The new particles of physics. Neutrons. Nuclei. The new periodic table. Ionizing radiations and matter. Radiation and life. Isotopes in research. Fusion research. Major facilities of the AEC. Major tools of the AEC.

■ NUCLEAR PROPULSION FOR MERCHANT SHIPS

By A. W. Kramer, editor of *Atomics*. U. S. Atomic Energy Commission, 1962.
600 pp., 159 illus., 5 $\frac{7}{8}$ × 9 $\frac{1}{8}$. Available from GPO, \$2.25.

A source book on commercial nuclear-ship propulsion. Commercial shipping people, port authorities, regulation officials, construction and design engineers, and interested laymen and writers will find it a valuable source of information. Selected references to additional material are included.

A substantial portion of the book is devoted to discussions of the N. S. *Savannah*, the first commercial nuclear ship.

CONTENTS: Why nuclear propulsion? The commercial nuclear-ship program in the United States. Basic principles of nuclear reactors. The N.S. *Savannah*. Hazards analysis. Operating and environmental considerations. Servicing nuclear ships. Training of the N.S. *Savannah* crew. International aspects of nuclear-ship propulsion. Suitability of different reactor types. Economics of nuclear propulsion. Nuclear-tanker design. World nuclear-ship development. Appendixes: classification of ships in the U. S. Merchant Marine; N.S. *Savannah* reactor design considerations, heat-transport auxiliary systems, supporting systems, main and auxiliary machinery, and control and instrumentation. Glossary. Index.

■ RADIATION USES IN INDUSTRY AND SCIENCE

By Lloyd E. Brownell, consultant to the USAEC. U. S. Atomic Energy Commission, 1961.
420 pp., 230 illus., 7 $\frac{7}{8}$ × 10 $\frac{1}{4}$. Available from GPO, \$2.50.

An introductory book to the broad field of the use of radiation in science and industry. It is written for the technical reader of any discipline in such a way that the text also will be helpful to the diligent, inquiring layman. More information than that in the necessarily condensed chapters can be found in the numerous selected references.

CONTENTS: Properties of ionizing radiations. Controlled fission and nuclear reactors. Reactors as industrial sources of radiation. Uses of radiation in industry. Applications of tracer studies and autoradiography. Promotion of chemical reactions by radiation. Effects of radiation on biological materials and simple organisms. Effects of radiation on plants, foods, and pharmaceuticals. Possible practical applications of the biological effects of gamma radiation. Electronic detection and measurement of radiation.

■ **SOURCEBOOK ON ATOMIC ENERGY**
(2nd edition)

By Samuel Glasstone, consultant to the USAEC.

D. Van Nostrand Co., 1958.

641 pp., 124 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$4.40.

A source of basic atomic-energy information for readers with varied interests.

This book has been translated into Croatian-Serbian, Japanese, Polish, Spanish, and Korean and is being translated into Arabic, Turkish, and German.

CONTENTS: Foundations of the atomic theory. Fundamental particles. Energy and radiation. Structure of the atom. Natural radioactivity. Measurement of nuclear radiations. Properties of nuclear radiations. Isotopes. Acceleration of charged particles. Nuclear transmutations and artificial radioactivity. The neutron. Nuclear forces and nuclear structure. Nuclear fission. Utilization of nuclear energy. Nuclear reactors. New elements. Uses of isotopes and radiations. Cosmic rays and strange particles. Radiation protection and health physics. Name and subject indexes.

BIOLOGY AND MEDICINE

■ **BIOLOGICAL EFFECTS OF EXTERNAL
BETA RADIATION (NNES)**

Edited by Raymond E. Zirkle, Institute of Radiobiology and Biophysics, University of Chicago.

McGraw-Hill, 1951.

242 pp., 82 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 6224. Microfilm, \$3.15; paper binding, \$9.40; library binding, \$11.65; plus shipping and handling charges.

A report on the findings of an intensive radiobiological program carried out during World War II at the Clinton Laboratories.

CONTENTS: Techniques of external beta irradiation. Gross effects of beta irradiation on restricted surface of rabbits. Comparative lethal effects of external beta irradiation. Gross effects of total-

body irradiation. Recovery from total-body irradiation. Additivity of lethal effects of external beta and gamma irradiation. Influence of total-body beta irradiation on the gross metabolic pattern of rats. Histopathological effects of single total-body beta irradiation on mice. Effects of external beta irradiation on the peripheral blood of rabbits. Changes in peripheral blood after single doses of external beta irradiation. Reactions of human skin to single doses. Delayed effects. Effects of periodic total-body irradiation. Aberrant tissue developments of rats exposed to beta rays. Tumor-inducing action of superficial radiations. Index.

■ **BIOLOGICAL EFFECTS OF EXTERNAL
RADIATION (NNES)**

Edited by Henry A. Blair, School of Medicine and Dentistry, University of Rochester.

McGraw-Hill, 1954.

508 pp., 174 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 6223. Microfilm, \$6.15; paper binding, \$18.40; library binding, \$20.85; plus shipping and handling charges.

A book that deals with the biological effects of X irradiation and the chronic effects of neutron irradiation.

CONTENTS: Studies of the effects of massive doses of X radiation on mortality in laboratory animals. Pathological changes exhibited by animals exposed to single doses of X radiation. Effects of acute exposure to X radiation on the peripheral blood of experimental animals. Callicrein and radiation. Cross-circulation experiments. Finger-ridge changes in monkeys following X irradiation. Experiments on the validity of the linear relation of mutation frequency to X-ray dose in *Drosophila melanogaster*. Comparison of X- and beta-radiation effects in rabbits. Observations on animals exposed to whole-body X radiation in divided doses over long periods: introduction and techniques. Effects of chronic exposure to X radiation on growth and survival. Effects of chronic exposure to X radiation on the peripheral blood of experimental animals. Pathology in animals subjected to repeated daily exposure to X rays. Blood chemistry study in dogs exposed to chronic X radiation. Effect of short-wavelength radiations on human finger-ridge detail. Influence of chronic irradiation with gamma rays at low dosages on mutation rate in *Drosophila melanogaster*. Fast-neutron-irradiation procedure. Clinical, pathological, and hematological effects of chronic neutron irradiation. Index.

■ **BIOLOGICAL EFFECTS OF EXTERNAL X
AND GAMMA RADIATION (Part I) (NNES)**

Edited by Raymond E. Zirkle, Institute of Radiobiology and Biophysics, University of Chicago.

McGraw-Hill, 1954.

530 pp., 246 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 6225. Microfilm, \$6.50; paper binding, \$19.45; library binding, \$21.70; plus shipping and handling charges.

A report on the findings of an intensive radiobiological program carried on during World War II at the Metallurgical Laboratory and the National Cancer Institute.

CONTENTS: Effects of long-continued total-body gamma irradiation on mice, guinea pigs, and rabbits. Effects of total-body X irradiation on rabbits. Effects of total-body X irradiation on a preexisting induced anemia in rabbits. Heparinemia: an anticoagulant in the blood of dogs with a hemorrhagic tendency after total-body exposure to roentgen rays. Electrophoretic study of the effects of X rays on the plasma protein pattern in dogs. Effects of X rays on the activity of enzymes and on tissue metabolism, on the metabolism of the small intestine and its permeability to glucose, and on immunity. Radiation-induced changes in ultraviolet absorption spectra of urine. Effectiveness of drugs in preventing or alleviating X-ray damage. Methods of exposing animals to X rays. Index.

■ BIOLOGICAL EFFECTS OF EXTERNAL X AND GAMMA RADIATION (Part II) (NNES)

Edited by Raymond E. Zirkle, Institute of Radiobiology and Biophysics, University of Chicago.

U. S. Atomic Energy Commission, 1956.
477 pp., 206 illus., 6×9 . Available from the Federal Clearinghouse as Report TID-5220. Microfilm, \$15.70; Xerox, \$23.50.

A report on additional findings of the radiobiological program carried on during World War II at the Metallurgical Laboratory and the Clinton Laboratories.

■ BIOLOGICAL STUDIES WITH POLONIUM, RADIUM, AND PLUTONIUM (NNES)

Edited by Robert M. Fink, University of California at Los Angeles.

McGraw-Hill, 1950.
411 pp., 96 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 13865. Microfilm, \$5.00; paper binding, \$14.95; library binding, \$17.20; plus shipping and handling charges.

A book that deals with the distribution and excretion of polonium and radium, as well as with the comparative toxicities of polonium, plutonium, and radium.

CONTENTS: General methods used in polonium distribution and excretion experiments. Polonium

distribution and excretion experiments with animals. Studies of polonium metabolism in human subjects. Historical background. General methods used in radium distribution and excretion experiments. Radium distribution and excretion studies with rats. Pilot studies on the intravenous lethal dosage of polonium, plutonium, and radium in rats. Simultaneous studies on the intravenous lethal dosage of polonium, plutonium, and radium in rats. Appendix: list of personnel cooperating in the research reported in this volume. Index.

■ DYNAMIC CLINICAL STUDIES WITH RADIOISOTOPES (No. 3 of AEC Symposium Series)

Edited by Ralph M. Kniseley, Oak Ridge Institute of Nuclear Studies, W. Newlon Tauxe, Mayo Clinic, and Elizabeth B. Anderson, Oak Ridge Institute of Nuclear Studies.

U. S. Atomic Energy Commission, 1964.
634 pp., 348 illus., 6×9 . Available from the Federal Clearinghouse as Report TID-7678, \$4.50.

Proceedings of a symposium held at the Oak Ridge Institute of Nuclear Studies, October 21–25, 1963. This volume is a companion to "Progress in Medical Radioisotope Scanning" (Report TID-7673).

CONTENTS: 27 papers covering recent advances in mathematics, laboratory medicine, and technology in this area.

■ HISTOPATHOLOGY OF IRRADIATION FROM EXTERNAL AND INTERNAL SOURCES (NNES)

Edited by William Bloom, University of Chicago.

McGraw-Hill, 1948.
808 pp., 548 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 16842. Microfilm only, \$9.90; plus shipping and handling charges.

A report on three years of intensive war research undertaken to compare histological changes that result from various types of radiations originating externally and internally.

CONTENTS: Introduction. Materials and methods. The cell. The skin. Bone. Bone marrow. Spleen. Lymph node and intestinal lymphatic tissue. Thy-mus. Gastrointestinal tract. Structures accessory to the gastrointestinal tract. Testis. Ovary. Kidney. Lung. Vascular system. Adrenal. Nervous system. Summary. Appendix: experiments listed by agent, animal species, and mode of administration. Bibliography. List of experiments. Index.

■ **INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT: Survey and Collected Papers (NNES)**

Edited by Robert S. Stone, School of Medicine, University of California.
McGraw-Hill, 1951.

511 pp., 118 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 13917. Microfilm, \$6.25; paper binding, \$18.75; library binding, \$21.00; plus shipping and handling charges.

A description of the problems faced by the Medical Section of the Metallurgical Laboratory at the outset of the Atomic Energy Project in determining the injuries that could result from exposure to radiation, some of the clinical tests devised, and the results of special studies.

CONTENTS: General introduction. Medical services. Biological bases for maximum permissible exposures. Personnel protection. Clinical laboratory examination. Hematological effects of ionizing radiations. Biochemical studies of effects of radiation and metals. Uranium excretion studies. Distribution and excretion of plutonium. Management and treatment of exposed personnel. Requirements of an adequate health service. Industrial medical program at Hanford. Blood changes in humans following total-body radiation. Hematological studies on patients following total-body X-ray exposure. Changes in mean blood levels. Biometric investigations of blood constituents and characteristics. Effect of exercise on leucopenia. Radium in excreta. Treatment of plutonium poisoning by metal displacement. Status of health and protection at Hanford. Tolerance to whole-body irradiation of advanced-cancer patients. Index.

■ **IRRADIATION AND THE NERVOUS SYSTEM**

By Charles D. Van Cleave, School of Medicine, University of North Carolina.
Rowman and Littlefield, 1963.
431 pp., 39 illus., 6×9 , \$9.75.

A survey and critical evaluation of past and present work (including that of the USSR) concerning the effects of ionizing radiation on the nervous system. Written primarily for radiologists, neurologists, and radiobiologists, the book covers areas of considerable interest to neurosurgeons, neuropharmacologists, neurophysiologists, neuroanatomists, physiologists, and biochemists.

Full reference coverage of Western and Soviet current studies on the deleterious effects of radiation on the central nervous system is included.

CONTENTS: Introduction. Effects of roentgen and radium radiation on the central nervous system of animals (1895 to 1950). Effects of therapeutic doses

of X rays and radium on the central nervous system of man (1896 to 1945). Effects of ionizing radiation on autonomic and peripheral nervous tissue in man and experimental animals. Effects of ionizing radiation on the developing nervous system. Effects of massive high-intensity doses of ionizing radiation on the central nervous system of animals. Effects of whole-body exposures to ionizing radiations on the central nervous system of man. Effects of particle irradiation of the central nervous system. Neurochemistry, electron microscopy, and the hematoencephalic barrier. Effects of radiation on sensory receptors. Functional changes in the nervous system resulting from irradiation. Behavioral responses to ionizing radiation. General summary. Bibliography. Index.

■ **MEDICAL ASPECTS OF RADIATION ACCIDENTS**

By Eugene L. Saenger, University of Cincinnati, Cincinnati General Hospital.
U. S. Atomic Energy Commission, 1963.
357 pp., 37 illus., $5\frac{1}{8} \times 9\frac{1}{8}$. Available from GPO, \$1.75.

A presentation of the pertinent, tested, and useful information needed by anyone faced with a radiation emergency. The health physicist and the physician will have easy reference to the factual material provided. Presented first are the simplest instructions; these are then elaborated with the rules governing them in the next section. Following sections examine various possibilities of radiation accidents with a discussion of the technique for coping with each problem.

CONTENTS: Summary—A cookbook approach. The accident—procedures to be followed in the first 12 hours. The accident—later emergency period. Clinical features of the acute radiation syndrome. Therapy and long-term follow-up studies. Hospital disaster plans for radiation accidents. Problems of psychological upset. Accidents involving radiation exposure. Role of civilian authorities. Government aid and legal requirements. The relation of radiation accidents to mass disaster and large-scale emergency programs. Appendix. Index.

■ **MEDICAL EFFECTS OF THE ATOMIC BOMB IN JAPAN (NNES)**

Edited by Ashley W. Oughterson, School of Medicine, Yale University, and Shields Warren, New England Deaconess Hospital.
McGraw-Hill, 1956.

477 pp., 324 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 10619. Microfilm, \$5.80; plus shipping and handling charges.

A report on the results of the investigations by the Joint Commission for the Investigation

of the Effects of the Atomic Bomb in Japan following the bombing of Hiroshima and Nagasaki.

CONTENTS: Summary. Prelude to medical investigation. Scope of damage and the effects on medical care and facilities. Number and types of casualties. Clinical observations in Hiroshima and Nagasaki. Hematology of atomic-bomb injuries. Pathology of atomic-bomb injuries. Appendixes: organization and personnel of the Joint Commission and collaborating groups; materials and methods of investigation; reports of Japanese scientists and physicians; studies of population and casualties; statistical survey of survivors; summary tables for Chaps. 4 and 5. Index.

■ PHARMACOLOGY AND TOXICOLOGY OF URANIUM COMPOUNDS (Parts I and II) (NNES)

Edited by Carl Voegtlin and Harold C. Hodge, University of Rochester.
McGraw-Hill, 1949.

1084 pp., 373 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 13863. Microfilm, Part I, \$6.35; Part II, \$6.70; paper binding, Part I, \$19.00; Part II, \$20.10; library binding, \$2.25 additional; plus shipping and handling charges.

A report on the comprehensive experimental studies on uranium compounds. It includes some observations on the toxic action of fluorine and hydrogen fluoride.

CONTENTS: Part I: Chemistry of Uranium Compounds. Analytical methods for uranium and fluorine. Statistical methods. Pathological anatomy following poisoning. Characteristics of poisoning. Toxicity after parenteral administration of soluble salts. Toxicity of compounds when fed to experimental animals. Toxicology following application to skin and eyes. Toxicity following inhalation. Distribution and excretion. Tolerance. Action on enzymes and proteins. Catalasuria as a sensitive test for poisoning. Mechanism of action in animals. Studies on human exposure. Part II: Toxicity Following Inhalation of Fluorine and Hydrogen Fluoride. Appendix: organization charts and personnel. Index.

■ PHARMACOLOGY AND TOXICOLOGY OF URANIUM COMPOUNDS (Parts III and IV) (NNES)

Edited by Carl Voegtlin and Harold C. Hodge, University of Rochester.
McGraw-Hill, 1953.

1379 pp., 510 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 13863. Microfilm, Part III, \$8.70; Part IV, \$8.10; paper binding, Part III, \$26.05; Part IV, \$24.30; library binding, \$2.25 additional; plus shipping and handling charges.

A presentation concerned chiefly with chronic inhalation toxicity of uranium compounds and the mechanism of uranium poisoning.

CONTENTS: Part III: Chemistry. Biochemical methods. Oral toxicity. Toxicity following inhalation for one and two years. Insufflation studies in rabbits. Part IV: Metabolic Studies. Deposition of uranium in bone. Studies in cell metabolism. Maximum allowable concentration of uranium dust in air. Biological effects of uranium: literature review. Special materials. Summary. Appendix: organization charts and personnel. Cumulative index for Parts I to IV.

■ PROGRESS IN MEDICAL RADIOISOTOPE SCANNING (No. 1 of AEC Symposium Series)

Edited by Ralph M. Kniseley and Gould A. Andrews, Oak Ridge Institute of Nuclear Studies, C. Craig Harris, Oak Ridge National Laboratory, and Elizabeth B. Anderson, Oak Ridge Institute of Nuclear Studies.

U. S. Atomic Energy Commission, 1964.
539 pp., 360 illus., 6×9 . Available from the Federal Clearinghouse as Report TID-7673, \$3.50.

Proceedings of a symposium held at the Oak Ridge Institute of Nuclear Studies, October 22-26, 1962.

CONTENTS: 21 papers on six major areas: instrumentation for area scanning; special scanning devices and techniques; tracers for scanning; thyroid scanning; brain scanning; and liver, kidney, and spleen scanning.

■ PULMONARY DEPOSITION AND RETENTION OF INHALED AEROSOLS (AEC-AIHA Monograph)

By T. F. Hatch and P. Gross, Graduate School of Public Health, University of Pittsburgh.

Academic Press, 1964.

192 pp., 71 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Paper binding, \$3.45; library binding, \$5.95.

A monograph that provides an understanding of the ways in which inhaled particles are handled in the respiratory system, necessary to understand health hazards from particulate air pollution, and how such diseases start. This book should be useful to industrial hygienists, health physicists, microbiologists, industrial physicians, and medical specialists in radiation health, infectious diseases, and air pollution. Over 200 references are cited, including the most recent publications.

CONTENTS: Introduction. Anatomical and physiological factors in respiratory deposition of aero-

sols. Physical factors in respiratory deposition of aerosols. Experimental studies on deposition of inhaled aerosols. Pulmonary clearance. Experimental studies on pulmonary clearance. Disease risk from inhaled aerosols. Measurement of respirable aerosol exposure. Indexes.

■ **RADIATION BIOLOGY AND MEDICINE:**
Selected Reviews in the Life Sciences
(1958 Geneva Conference)

Edited by Walter D. Claus, Division of
Biology and Medicine, USAEC.

Addison-Wesley, 1958.

968 pp., 198 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$17.50.

A review of advances in thought and research in the uses and effects of nuclear radiation in the life sciences in the United States.

CONTENTS: Introduction. Basic mechanisms of biological reaction to radiation. Mutational effects of radiation. Mathematical biology. Mammalian response to radiation. Radiation safety. Medical uses of atomic radiation. Agricultural uses of radiation. Tracer applications. Instrumentation and dosimetry. Appendixes: training in radiation biology and related sciences; research contracts and grants. Index.

■ **RADIATION AND IMMUNE MECHANISMS**
(AEC-AIBS Monograph)

By William H. Taliaferro, Lucy Graves
Taliaferro, and Bernard H. Jaroslow,
Argonne National Laboratory.

Academic Press, 1964.

152 pp., 20 illus., 6×9 . Paper binding,
\$3.45; library binding, \$5.95.

A monograph that briefly outlines the humoral and cellular phases of innate and acquired immunity and reviews in greater detail the recent experimental work on the effects of irradiation on these mechanisms.

Besides being of interest to advanced students and to scientists working in other fields, the radiation effects described may serve as an introduction to immunologists who have not worked on the radiobiological aspects of their subject.

CONTENTS: Immune mechanisms. Qualifications affecting radiation-induced injury. Radiation-induced changes in the primary antibody response as related to biochemical and cellular phases. Radiation-induced changes in the primary antibody response as related to species, antigen dose, and radiation dose. Radiation-induced changes in the secondary antibody response. Protection and restoration of antibody synthesis in irradiated animals. Innate antibodies. Radiation-induced injury to specific unresponsiveness (immunological tolerance). Delayed hypersensitivity. Effects of ionizing radiation on the cells involved in innate and acquired immunity. Radiation-induced changes in the course of infection. The action of radiomimetic substances on antibody formation. Concluding remarks.

■ **RADIATION, ISOTOPES, AND BONE**
(AEC-AIBS Monograph)

By Franklin C. McLean and Ann M. Budy,
University of Chicago.

Academic Press, 1964.

216 pp., 43 illus., $6 \times 9\frac{1}{4}$. Paper binding,
\$3.45; library binding, \$5.95.

A monograph that describes the ever increasing utilization by biologists of radiation and radioisotope techniques. Emphasizing that the importance of these new tools for studying living systems cannot be overestimated, the authors point to their application by biologists as having added significance—the new, closer association between the physical and biological sciences.

CONTENTS: Introduction. The histophysiology of bones and teeth. Bone-seeking elements. Detection and measurement of radioactivity. The mineral of bones and teeth. Distribution of radioelements in bone. Kinetics of the bone mineral. Mineral metabolism. Homeostasis in mineral metabolism. Application of tracer techniques to bone. Radioisotopes and the organic portion of bone. Effects of radiation upon bones. Natural radioactivity and radioactive fallout. The pathology and pathological physiology of bone. Author and subject indexes.

■ **RADIATION, RADIOACTIVITY, AND INSECTS**
(AEC-AIBS Monograph)

By R. D. O'Brien, Cornell University, and
L. S. Wolfe, Montreal Neurological In-
stitute.

Academic Press, 1964.

211 pp., 32 illus., $6 \times 9\frac{1}{4}$. Paper binding,
\$3.45; library binding, \$5.95.

A book designed for graduate and undergraduate students as well as for research workers. It gives a very complete account of the contributions made by the use of radiation and radioisotope methods to our knowledge of insects and insect control. It serves not only as an introduction to these important techniques for entomologists but also as a description of the advantages that insects offer as subjects for work with radiation and radioisotopes.

CONTENTS: Insects. Nongenetic effects of radiation. Tagging. Insect control by irradiation. Biochemistry. Physiology. Insects and light. Organophosphorus insecticides. Chlorinated hydrocarbons. Miscellaneous insecticides. Author and subject indexes.

■ **RADIOISOTOPE SCANNING**

By Marshall Brucer, Oak Ridge Institute
of Nuclear Studies.

U. S. Atomic Energy Commission, 1958.
169 pp., 69 illus., $8 \times 10\frac{1}{4}$. Available
from GPO as Report ORINS-20, \$1.00.

A presentation of the principles of the area scan. It discusses what can be done and, even more important in diagnosis, what cannot be done with the area scanner.

CONTENTS: Problem of scanning. Machinery for scanning. Factors of resolution. Methods of study and calibration. Definition in area scanning. Simple test scans. Complex scans of the standard manikin. Artifacts in the appearance of a scan. Examples of poor and good scans.

■ RADIOISOTOPES IN MEDICINE

Edited by Gould A. Andrews, Marshall
Brucer, and Elizabeth B. Anderson,
Oak Ridge Institute of Nuclear Studies.
U. S. Atomic Energy Commission, 1953.
817 pp., 552 illus., $7\frac{1}{2} \times 10\frac{1}{4}$. Available
from GPO as Report ORO-125, \$6.00.

A collection of lectures from a course on clinical uses of radioisotopes.

CONTENTS: Availability and uses of isotopes. Problems in radiation. Radiation measurement and dosimetry. Tumor localization. Diagnostic and therapeutic uses of radioiodine. Metabolic and vascular studies. Isotopes in the study and treatment of hematologic disorders. Therapy with radioactive colloids. Therapy with external and implanted sources. Bibliography. Index.

■ TOXICOLOGY OF URANIUM: Survey and Collected Papers (NNES)

Edited by Albert Tannenbaum, Medical
Research Institute, Michael Reese Hos-
pital.

McGraw-Hill, 1951.

333 pp., 77 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available
from University Microfilms as OP No.
13867. Microfilm, \$4.20; paper bind-
ing, \$12.60; library binding, \$14.60;
plus shipping and handling charges.

A report on investigations on the toxicology of uranium compounds together with associated studies. It is not intended as a complete text-book of uranium pharmacology and toxicology.

CONTENTS: Part A: Introduction and General Considerations. Nature of poisoning as observed in mice. Factors affecting poisoning. Distribution in tissues. Excretion. Gross and microscopic pathology of poisoning. Biochemical effects of poisoning. Mechanism of action and transport to tissues. Summary of experimental studies: relation to poisoning in man. Part B: Review of Poisoning Literature to 1942. Aspects of toxicology of uranium compounds. Failure to affect toxicity of ingested uranium chloride by dietary acid or base. Accumulation of ura-

nium in tissues of mice ingesting uranyl nitrate. Relation of uranium excretion to total amount in the mouse. Studies on acquired tolerance. Distribution of U^{235} in tissues of mice after injection of uranyl nitrate. Tracer studies of distribution and excretion in mice, rats, and dogs. Transport to tissues. Tissue metabolism of rats treated with uranyl nitrate. Reversible inhibition of enzymes. Effect on metabolism of yeast and bacteria. Introduction to nonclassified literature dealing with biochemical studies of experimental uranium poisoning. Effect of exposure on urinary catalase excretion. Studies of porphyrin metabolism: effect of metals on coproporphyrin excretion. Index.

CHEMISTRY

■ THE ACTINIDE ELEMENTS (NNES)

Edited by Glenn T. Seaborg, Radiation
Laboratory, University of California,
and Joseph J. Katz, Chemistry Division,
Argonne National Laboratory.

McGraw-Hill, 1954.

870 pp., 150 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available
from University Microfilms as OP No.
10620. Microfilm, \$10.50; paper bind-
ing, \$31.50; library binding, \$36.00;
plus shipping and handling charges.

A comprehensive survey of the chemistry and nuclear properties of the actinide elements.

CONTENTS: Introduction. Chemistry of actinium. Nuclear properties of uranium, protactinium, and thorium isotopes. Chemistry of thorium, protactinium, and uranium. Nuclear properties of plutonium isotopes. Oxidation states, potentials, equilibria, and oxidation-reduction reactions of plutonium. Ionic and molecular species of plutonium in solution. Preparation and properties of compounds of plutonium. Nuclear properties of neptunium isotopes. Chemistry of neptunium. Nuclear properties of transplutonium nuclides. Chemistry of transplutonium elements. Radiochemical separation of actinide elements. Radiochemical assay by alpha and fission measurements. Correlation of properties as actinide transition series. Crystal chemistry of the 5f elements. Optical properties of some compounds of uranium, plutonium, and related elements. Slow-neutron and spontaneous-fission properties of heavy nuclei. Appendix: table of atomic mass values (physical scale). Index to the transuranium elements. Index.

■ ANALYSIS OF ESSENTIAL REACTOR MATERIALS

Edited by C. J. Rodden, Director, New
Brunswick Laboratory, USAEC; con-
tributions from other authorities.

U. S. Atomic Energy Commission, 1964.
1280 pp., 211 illus., $5\frac{7}{8} \times 9\frac{1}{8}$. Available
from GPO, \$4.25.

A book that gives the analytical chemist the information needed to carry out many of the analyses involved, without the necessity of further literature searching, in the analysis of the most important nuclear reactor materials. The book is a compilation of the analytical methods presently used for the analysis of many materials used in atomic energy. It is divided into two parts: one part describes methods for the determination of individual elements, and the other part deals with general instrumental methods.

CONTENTS: Uranium. Plutonium. Thorium. Beryllium. Alloys and ceramics. Expended reactor fuels. Graphite. Boron. Heavy water. Reactor coolants. Trace elements. Spectrochemical methods. Mass spectrometry. Radiochemical and nuclear methods. Electrometric methods. X-ray spectroscopy. Index.

■ ANALYTICAL CHEMISTRY OF THE MANHATTAN PROJECT (NNES)

By Clement J. Rodden, New Brunswick Laboratory, USAEC.

McGraw-Hill, 1950.

748 pp., 151 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 16859. Microfilm, \$9.00; paperbinding, \$26.90; library binding, \$29.15; plus shipping and handling charges.

An outline of the analytical chemistry methods used during the Manhattan Project.

CONTENTS: Uranium. Thorium. Nitrogen. Silicon. Fluorine and fluorocarbons. Carbon, hydrogen, and oxygen. Chlorine, bromine, and iodine. Sulfur, selenium, and tellurium. Phosphorus, arsenic, antimony, and bismuth. Sodium, potassium, rubidium, and cesium. Beryllium, magnesium, calcium, strontium, barium, and radium. Germanium, tin, and lead. Aluminum, gallium, indium, and thallium. Zinc, cadmium, and mercury. Copper, silver, and gold. Iron, cobalt, and nickel. Manganese, technetium, and rhenium. Chromium, molybdenum, and tungsten. Vanadium, columbium, and tantalum. Titanium, zirconium, and hafnium. Platinum metals. Scandium, yttrium, and rare earths. Electrolytic separation methods. Photometric methods. Electrometric methods. Spectrochemical methods. Low-pressure methods. Radiochemical analytical methods. Other methods. Index.

■ BIBLIOGRAPHY OF RESEARCH ON HEAVY HYDROGEN COMPOUNDS (NNES)

Compiled by Alice H. Kimball, formerly at Substitute Alloys Materials Laboratories, Columbia University.

McGraw-Hill, 1949.

350 pp., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 6235. Microfilm, \$4.30; paper binding, \$12.80; library binding, \$15.05; plus shipping and handling charges.

A bibliography of research on heavy hydrogen and its compounds, arranged alphabetically according to the name of the senior author of each work.

■ CHEMICAL PROCESSING AND EQUIPMENT (1955 Geneva Conference)

Staffs, National Reactor Testing Station and Brookhaven National Laboratory.

McGraw-Hill, 1955.

302 pp., 211 illus., $8 \times 10\frac{1}{2}$, \$6.00.

Describes the chemical processing of reactor fuel elements at the Idaho Chemical Processing Plant.

CONTENTS: Process. Plant facilities. Process equipment. Decontamination of equipment for maintenance. Analytical section of the Idaho Chemical Processing Plant. Health physics at chemical processing plant. Costs. Laboratory equipment. Enclosures for radioactive operations. Viewing and optical equipment. Manipulators. Chemical equipment. Physical-measurement equipment. Machine tools. Materials-handling equipment. Decontamination and monitoring instrument arrangements. Irradiation facilities.

■ CHEMICAL PROCESSING EQUIPMENT: ELECTROMAGNETIC SEPARATION PROCESS (NNES)

By G. A. Akin, H. P. Kackenmaster, R. J. Schrader, J. W. Strohecker, and R. E. Tate, Tennessee Eastman Corporation, U. S. Atomic Energy Commission, 1951.

506 pp., 159 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from the Federal Clearinghouse as Report TID-5232. Microfilm, \$11.10; photostat, \$77.40.

An outline of the general scope of the chemical processing equipment connected with the electromagnetic method of separating the isotopes of uranium.

■ THE CHEMISTRY AND METALLURGY OF MISCELLANEOUS MATERIALS (NNES)

Edited by Laurence L. Quill, Department of Chemistry, Michigan State College. U. S. Atomic Energy Commission, 1955.

172 pp., 38 illus., $8 \times 10\frac{1}{2}$. Available from the Federal Clearinghouse as Report TID-5212. Microfilm, \$5.42; Xerox, \$12.50.

A presentation of data on the crystal chemistry of many materials, on geochemistry, on the chemistry and metallurgy of beryllium and rare-earth elements, and on other related topics.

CONTENTS: The rate of sublimation of solids. The preparation of cerium by electrolysis of molten salts and by chemical reduction in open crucibles in an inert atmosphere. The production of cerium in the massive metallic state. The casting of cerium and some properties of the cast metal. Recovery of iodine from cerium slag. The production of beryllium by the metallothermic reduction of beryllium fluoride. The extrusion of beryllium. Production of beryllium metal ingots for extrusion. Fused beryllium oxide and refractory shapes. Geochemistry of beryllium, germanium, indium, columbium, and tantalum. Remote control for continuous liquid extractors. Solubility of xenon and nitric oxide in various solvents. Infrared spectrum of benzene. Minimum hydrogen peroxide concentration required for precipitate formation from 50% uranyl salt solutions. The system nitric acid-water-methyl isobutyl ketone. The preparation of tungsten hexafluoride. The preparation of molybdenum hexafluoride. Production of high boron steel. The crystal structure of trichlorides, tribromides, and trihydroxides of uranium and of rare-earth elements. Identification and crystal structure of barium hydrogen phosphate. Bibliography.

■ THE CHEMISTRY AND METALLURGY OF MISCELLANEOUS MATERIALS: THERMODYNAMICS (NNES)

Edited by Laurence L. Quill, Department of Chemistry, Michigan State College.
McGraw-Hill, 1950.

329 pp., 26 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 10618. Microfilm, \$4.10; paper binding, \$12.30; library binding, \$14.55; plus shipping and handling charges.

A presentation of material relating to thermodynamics in the broad categories of metallurgy, refractories, and general chemistry.

CONTENTS: Investigations in the liquid-solid equilibria of two-component systems composed of the bromides and iodides of strontium and barium. Temperature-composition diagrams of metal-metal halide systems. Thermodynamic and physical properties of the elements. Thermodynamic and physical properties of nitrides, carbides, sulfides, silicides, and phosphides. Thermodynamic properties of common gases and the halides. Fusion and vaporization data of the halides. Thermodynamic properties of molybdenum and tungsten halides and the use of these metals as refractories. Heats of formation of CeS , Ce_2S_4 , and Ce_2S_3 at 25°C . Heat of reaction of the cerous-ceric couple in 0.5 molal perchloric acid at 25°C .

■ THE CHEMISTRY OF URANIUM: PART I. THE ELEMENT, ITS BINARY AND RELATED COMPOUNDS (NNES)

By Joseph J. Katz, Chemistry Division, Argonne National Laboratory, and Eugene Rabinowitch, University of Illinois.

McGraw-Hill, 1951.

609 pp., 69 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from Dover Publications in reprint form, \$2.95. Also available from University Microfilms as OP No. 2250. Microfilm, \$7.40; paper binding, \$22.10; library binding, \$24.10; plus shipping and handling charges.

A presentation of the results of a program of experimental research in uranium chemistry undertaken at the inception of the Atomic Energy Project.

CONTENTS: The element uranium. Uranium metal. Binary compounds of uranium other than halides. Uranium halides and related compounds. Index.

■ GUIDE TO ACTIVATION ANALYSIS

Edited by William S. Lyon, Jr., Oak Ridge National Laboratory, with authors from other ORNL staff members.
D. Van Nostrand Co., 1964.

186 pp., 90 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$5.95.

A state-of-the-art presentation, as well as an exhaustive reference work, including detailed discussions of modern instrumental methods, neutron-flux monitoring problems, special applications, and new systems. The book comprises a concentration of the results of experiences gathered from the performance of over 300,000 nuclear analyses. The principles that have been developed and illustrated are applied to the solution of representative activation-analysis problems; calculations in these problems are shown in detail. This guide, written with sufficient clarity for the neophyte and sufficient depth for the sophisticate, will be a valuable addition to the library of those actively engaged or interested in nuclear methods of analysis.

CONTENTS: Basic nuclear properties and activation analysis. Reactor neutron flux: Characteristics and uses. Nonreactor neutron sources. Radiochemical separations. Scintillation counting techniques. Present byways and future trends in activation analysis. Practical examples of activation analysis. Appendixes: Calculated sensitivities. Radiation safety and licensing requirements.

■ HOT LABORATORY EQUIPMENT

Compiled by L. G. Stang, Jr., Brookhaven National Laboratory.

U. S. Atomic Energy Commission, 1958.
429 pp., 351 illus., $7\frac{7}{8} \times 10\frac{1}{4}$. Available from GPO, \$2.50.

A presentation of detailed descriptions and design data for facilities, equipment, and accessories used in handling moderate to large amounts of radioactive materials. This book is a greatly enlarged and updated version of Part II of "Chemical Processing and Equipment" (Report TID-5276), published by the AEC in 1955. The earlier work, known to hot-laboratory specialists as "The Hot Laboratory Catalog—First Edition," contained descriptions of 126 items of equipment; this revision contains descriptions of 229 items.

CONTENTS: Enclosures for radioactive operations. Viewing equipment. Manipulators. Chemical processing equipment. Equipment for measuring chemical and physical properties. Machine tools. Materials-handling equipment. Monitoring and decontamination equipment. Irradiation facilities. Special protective clothing. Shielding materials.

■ LOW-LEVEL RADIOACTIVE WASTES

Their Handling, Treatment, and Disposal

By C. P. Straub, Robert A. Taft Sanitary Engineering Center.

U. S. Atomic Energy Commission, 1964.
430 pp., 174 illus., $5\frac{7}{8} \times 9\frac{1}{8}$. Available from GPO, \$1.50.

A book that brings together pertinent material currently scattered throughout many project reports and published literature relating to continuous operations. It is written for those interested in low-level waste disposal; the health physicist; the water- and sewage-works personnel concerned with the efficiency of water- and sewage-treatment processes for the removal of radioactive materials; to personnel engaged in the design, construction, licensing, and operation of treatment facilities; and to the student of nuclear technology.

CONTENTS: Introduction. Sources, quantities, and composition of radioactive wastes. Collection, sampling, and measurement. Direct discharge to the water environment. Discharge to the soil environment. Disposal to the air environment. Air cleaning. Removal of radioactivity by water-treatment processes. Treatment of radioactive materials by biological processes. Treatment on site—chemical precipitation. Treatment on site—ion exchange and absorption. Treatment on site—electrodialysis, solvent extraction, and other methods. Treatment on site—evaporation and storage. Handling and treatment of solid wastes. Public-health implications. Appendixes. Index.

■ NOBLE-GAS COMPOUNDS

Edited by Herbert H. Hyman, Argonne National Laboratory.

Univ. of Chicago Press, 1963.
404 pp., 96 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$12.50.

A summary of the material made available at a two-day meeting in April 1963 at Argonne National Laboratory of the scientists who had contributed to the study of noble-gas compounds.

CONTENTS: Historical and introductory material. Preparation and some properties of noble-gas fluorides. Some practical considerations. Thermochemistry. Aqueous chemistry of noble-gas compounds. Diffraction studies and the structure of xenon compounds. Studies of ESR, NMR, Mossbauer, IR, and Raman Spectra and related experiments. Physiological properties of noble-gas compounds. Theoretical studies of noble-gas compounds. Appendix. Index.

■ OAK RIDGE NATIONAL LABORATORY MASTER ANALYTICAL MANUAL

By Division of Analytical Chemistry, Oak Ridge National Laboratory.

U. S. Atomic Energy Commission.

Available from the Federal Clearing-house.

A collection of analytical methods developed and used in the ORNL Analytical Chemistry Division. The Manual was begun in 1953, but it included methods used earlier. Since being placed on public sale in 1957 and 1958, annual supplements have been issued which contain reprints of new or revised methods.

□ *Section 1: Ionic Methods*

1600 pp., with illustrations, $8\frac{1}{2} \times 11$, \$9.00, Report TID-7015(Sec. 1), 1958.

A presentation of ionic methods, including general, physical, and chemical analyses.

□ *Section 2: Radiochemical Methods*

304 pp., with illustrations, $8\frac{1}{2} \times 11$, \$6.50, Report TID-7015(Sec. 2), 1957.

A presentation of radiochemical methods.

□ *Section 3: Spectrographic Methods and*□ *Section 5: Nuclear Analyses Methods*

157 pp., with illustrations, $8\frac{1}{2} \times 11$, \$3.50, Report TID-7015(Seccs. 3 and 5), 1957.

A presentation of spectrographic and nuclear analyses methods. The latter includes activation analyses, isotopic tracer analyses, autoradiographic analyses, and nuclear-particle attenuation analyses.

□ *Section 9: Process Methods*

Approximately 920 pp., with illustrations, $8\frac{1}{2} \times 11$, \$9.00, Report TID-7015(Sec. 9), 1958.

A presentation of procedures for process methods, including thorex, isolation, purex, radioisotope production, Homogeneous Reactor Project, and general methods.

□ *Supplement 1*

566 pp., with illustrations, $8\frac{1}{2} \times 11$, \$5.75, Report TID-7015(Suppl. 1), 1959.

A presentation of 41 new analytical methods to be inserted in various sections of the manual.

□ *Supplement 2*

670 pp., with illustrations, $8\frac{1}{2} \times 11$, \$6.75, Report TID-7015(Suppl. 2), 1960.

A presentation of 38 new analytical methods to be inserted in various sections of the manual.

□ *Supplement 3*

758 pp., with illustrations, $8\frac{1}{2} \times 11$, \$7.75, Report TID-7015(Suppl. 3), 1961.

A presentation of 44 new analytical methods to be inserted in various sections of the manual.

□ *Supplement 4*

Approximately 290 pp., with illustrations, $8\frac{1}{2} \times 11$, \$3.75, Report TID-7015 (Suppl. 4), 1962.

A presentation of 15 new analytical methods to be inserted in various sections of the manual as well as 17 revised issues and 2 corrected pages to be inserted for and in methods already published.

□ *Supplement 5*

Approximately 380 pp., with illustrations, $8\frac{1}{2} \times 11$, \$8.00, Report TID-7015(Suppl. 5), 1963.

A presentation of 33 new methods and 9 revised issues.

□ *Supplement 6*

Approximately 240 pp., with illustrations, $8\frac{1}{2} \times 11$, \$5.00, Report TID-7015(Suppl. 6), 1964.

A presentation of 13 new methods and 50 revised issues.

□ *Indexes to the ORNL Master Analytical Manual (1953-1963)*

139 pp., $8\frac{1}{2} \times 11$, \$2.50, Report TID-7015 (Indexes), Revision 1, 1964.

Prepared to facilitate use of the Manual, this document consists of a key-word index composed from method titles, a bibliographic index that is equivalent to a table of contents of the Manual, an author index, and method-number cross indexes. The bibliographic index gives the complete history and current status of each method. The indexes will be updated annually.

■ **PHYSICAL PROPERTIES AND ANALYSIS OF HEAVY WATER (NNES)**

By Isidor Kirshenbaum, Esso Laboratories, Standard Oil Development Company.

McGraw-Hill, 1951.

438 pp., 150 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 797. Microfilm, \$5.30; paper binding, \$15.90; library binding, \$19.90; plus shipping and handling charges.

A discussion of the physical properties of heavy water, chemical equilibrium or exchange reactions, various methods of isotopic analysis, and natural abundance of hydrogen and oxygen isotopes.

CONTENTS: Physical properties. Equilibrium constants for exchange reactions. Isotopic analysis by the mass spectrometer. Isotopic analysis of heavy water by the mass spectrometer. Other methods of isotopic analysis of heavy water. Natural abundance of hydrogen and oxygen isotopes. Author and subject indexes.

■ **POLONIUM (NNES)**

Edited by Harvey V. Moyer, Professor of Chemistry, The Ohio State University.

U. S. Atomic Energy Commission, 1956.

392 pp., 142 illus., 6×9 . Available from University Microfilms as OP No. 6233. Microfilm, \$4.80; paper binding, \$14.35; library binding, \$16.60; plus shipping and handling charges. Also available from the Federal Clearinghouse as Report TID-5221. Microfilm, \$11.10; photostat, \$58.80.

A presentation of the results of research at Mound Laboratory on the nuclear, physical, and chemical properties of polonium; extraction of polonium from lead residues; chemical-separation methods and separation by distillation of polonium from irradiated bismuth; protection of personnel from radiological hazards; and waste disposal.

CONTENTS: Survey of early operations. Nuclear properties of polonium. Physical properties of polonium. Chemical properties of polonium. Biological

research related to polonium. Polonium from lead residues. Polonium from irradiated bismuth: chemical separation and studies on separation by distillation. Instrumentation. Calorimetry. Waste disposal. Neutron sources and alpha sources. Health physics. Appendixes: observed lines of polonium; energy levels of Po I; observed band heads of polonium; vibrational energy levels of ground state of Po_2^{210} ; vibrational energy levels of excited state of Po_2^{210} referred to lowest level of ground state; comparison of observed and calculated isotope shifts. Index.

■ **PREPARATION, PROPERTIES, AND TECHNOLOGY OF FLUORINE AND ORGANIC FLUORO COMPOUNDS (NNES)**

Edited by Charles Slesser and Stuart R. Schram, New York Operations Office, USAEC.

McGraw-Hill, 1951.

868 pp., 241 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 16830. Microfilm, \$10.45; paper binding, \$31.25; library binding, \$33.50; plus shipping and handling charges.

A description of how organic fluoro compounds of various types were prepared in the laboratory, how their physical and chemical properties were studied and how they were rapidly brought to industrial-scale production.

CONTENTS: Generation of fluorine. Handling of fluorine. Partial fluorination of organic compounds by replacement of chlorine. Realization of perfluorocarbons. Preparation and properties of chlorotrifluoroethylene polymer. Miscellaneous investigations. Appendixes: nomenclature; present professional addresses of individual contributors. Index.

■ **PRODUCTION OF HEAVY WATER (NNES)**

Edited by George M. Murphy, Washington Square College, New York University; Harold C. Urey, Institute for Nuclear Studies, University of Chicago; and Isidor Kirshenbaum, Esso Laboratories, Standard Oil Development Company.

McGraw-Hill, 1955.

394 pp., 97 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 13866. Microfilm, \$4.85; paper binding, \$14.45; library binding, \$16.45; plus shipping and handling charges.

A survey of heavy-water plants and their operation and a description of the results of pilot-plant studies on development processes.

CONTENTS: Commercial production: Catalytic exchange. Water distillation. Hydrogen distillation.

Miscellaneous processes. Laboratory studies: Water distillation. Catalytic exchange. Nickel-chromium oxide as a catalyst for isotopic exchange between hydrogen and water. Platinum and palladium catalysts. Hydrogen-water vapor exchange glass pilot plant. Dual-temperature process. Appendixes: electrolytic process; operating data; illustrative calculations of fourth-stage tower performance data and of alpha for a secondary-plant rundown; equilibrium constants for exchange reactions involving mercaptans. Index.

■ **RADIATION EFFECTS ON ORGANIC MATERIALS**

Edited by Robert O. Bolt and James G. Carroll, California Research Corporation.

Academic Press, 1963.

576 pp., 181 illus., $6\frac{1}{4} \times 9\frac{1}{2}$, \$13.50.

A book that covers the effects of radiation on organics. It is useful to both the radiation-effects experimenter and the designer. Theory is not detailed but is adequate so that one can reasonably predict the nature and amount of radiation effects on a certain type of material. Numerous tables and charts are included. This information is vital to engineers and experimenters alike.

CONTENTS: Introduction. Interaction of radiation with matter. Mechanisms of chemical effects of ionizing radiation. Radiation chemistry of pure compounds. Polymers. Plastics. Elastomeric materials. Coolants. Lubricants. Adhesives. Textiles. Coatings and films. Dielectric fluids. Fuels and fluid shield materials. Coal, wood, and explosives. Potential benefits. Author and subject indexes.

■ **RADIOCHEMICAL STUDIES: THE FISSION PRODUCTS (NNES)**

Edited by Charles D. Coryell, Laboratory for Nuclear Science and Engineering, Massachusetts Institute of Technology, and Nathan Sugarman, Institute for Nuclear Studies, University of Chicago.

McGraw-Hill, 1951.

2086 pp., 682 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 4944. Microfilm, Vol. 1, \$6.40; Vol. 2, \$9.50; Vol. 3, \$9.25; paper binding, Vol. 1, \$19.10; Vol. 2, \$28.50; Vol. 3, \$27.75; library binding, \$2.25 additional; plus shipping and handling charges.

A presentation of the results of research completed at Ames, Chicago, Oak Ridge, Berkeley, Bloomington, Hanford, and Los Alamos.

CONTENTS: Counting techniques. Chemical studies at tracer levels. Remote-control techniques. Studies of the fission process. Radioactivity of the fission products. Radiochemistry of the fission-product elements. Special studies of gaseous fission products. Radiochemical studies of other activities. Appendixes: fission-product decay chains; fission yields; nuclides formed in thermal fission. Author and subject indexes.

■ RAW MATERIALS DEVELOPMENT LABORATORY HANDBOOK OF ANALYTICAL METHODS

Compiled and edited by M. A. DeSesa,
National Lead Company, Inc.

U. S. Atomic Energy Commission, 1957.

140 pp., 13 illus., $8\frac{1}{2} \times 10\frac{3}{4}$. Available
from the Federal Clearinghouse as
Report TID-7002 (Rev. 1), \$3.75.

A discussion of analytical procedures for the chemical determinations of free acid in the presence of hydrolyzable ions; acid consumption during ore leaching; alcohol modifiers in organic extractants; carbonates and bicarbonates with or without uranium in solution; amines in kerosene solvents; arsenic, boron, calcium, and CO_2 in carbonate; Cl^- , cobalt, copper, and di-(2-ethylhexyl)phosphoric acid in kerosene; and F^- , iron, magnesium, manganese, molybdenum, NO_3^- , PO_4^{3-} , SiO_2 , sulfur, SO_4^{2-} , tetrathionates, thorium, TBP, uranium, and vanadium.

■ SELECTED MEASUREMENT METHODS FOR PLUTONIUM AND URANIUM IN THE NUCLEAR FUEL CYCLE

Compiled and edited by Ralph J. Jones,
Division of Nuclear Materials Manage-
ment, USAEC.

U. S. Atomic Energy Commission, 1963.

419 pp., 109 illus., $7\frac{3}{4} \times 10$. Available
from GPO, \$3.50.

Provides selected methods for the measurement of source and special materials, for accountability of materials transferred, or for process control. Methods were selected by means of a series of seminars of persons of recognized technical competence in specific fields of measurement. The experience of both government and private facilities was utilized in this selection.

CONTENTS: Part I: General Considerations. Introduction. Standard reference materials. Sampling, bulk measurements. Statistics of measurement. Part II: Analytical Methods. Uranium concentration measurement. Uranium isotopic composition measurement. Plutonium concentration measurement. Plutonium isotopic composition measurement. Appendix. Supplementary methods.

■ SEPARATION OF THE BORON ISOTOPES (NINES)

Edited by George M. Murphy, New York
University.

U. S. Atomic Energy Commission, 1952.

485 pp., 185 illus., 6×9 . Available from
the Federal Clearinghouse as Report
TID-5227, \$7.00.

A description of the results of preliminary work on isotope separation to obtain a large quantity of crystalline boron, including a quantity containing at least 90% B^{10} .

CONTENTS: Part I: Isotope Separation. Introduction. Selection of method. Pilot-plant experiments for determination of the fractionation factor. Decomposition of the ether complexes. Stability of construction materials to the dimethyl ether complex. Chemistry of wet complex. Other research and development necessitated by plant problems. Further experiments on exchange reactions of complex and other compounds of boron. Part II: Preparation of Elemental Boron. Introduction. Conversion of dimethyl ether-boron trifluoride complex to boron trichloride. Production of crystalline boron. Conversion of dimethyl ether-boron trifluoride complex to boron. Part III: Miscellaneous Studies. Analysis for isotopic abundance. Methods of chemical analysis. Physical and chemical properties. Index.

ENGINEERING

■ CRYOGENIC ENGINEERING

By Russell B. Scott, Chief, Cryogenic
Engineering Laboratory, National Bu-
reau of Standards.

D. Van Nostrand Co., 1959.

375 pp., 207 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$7.00.

A book, prepared by the National Bureau of Standards for the AEC, intended primarily for students, engineers, and scientists who are unfamiliar with low-temperature techniques. It outlines the practical aspects of cryogenic processes and equipment, at the same time providing a careful discussion of the underlying theory. The entire range of cryogenic engineering is covered: the development and improvement of low-temperature processes and equipment; the determination of the physical properties of materials used to produce, maintain, and utilize low temperatures; and the practical application of low-temperature techniques and processes. The author has selected the most important and useful developments, concentrating on those features which seem likely to have further applications.

This book is being translated into Polish.

CONTENTS: Advances in cryogenic technology. Industrial applications of cryogenics. Cryogenics in rocketry. Engineering research and development at low temperatures. Liquefaction of gases. Separation of gases. Cooling by adiabatic demagnetization. Low-temperature thermometry. Insulation. Storing and transporting liquefied gases. Transfer of liquefied gases. Properties of cryogenic fluids. Low-temperature properties of structural materials. Appendix: tables of conversion factors. Name and subject indexes.

■ ELECTRICAL EQUIPMENT FOR TANKS AND MAGNETS (NNES)

By C. R. Baldock and E. D. Hudson, Carbide and Carbon Chemicals Corporation. U. S. Atomic Energy Commission, 1947. 401 pp., 168 illus., 6 × 9. Available from University Microfilms as OP No. 6227. Microfilm, \$4.85; paper binding, \$14.55; library binding, \$16.80; plus shipping and handling charges. Also available from the Federal Clearinghouse as Report TID-5214. Microfilm, \$11.10; photostat, \$62.10.

An account of the electrical-engineering phases of the electromagnetic process for the separation of uranium isotopes as they relate particularly to the electrical equipment for the tanks and magnets used in operating the calutrons at the Clinton Engineer Works.

CONTENTS: Part I: High-voltage Supplies. Introduction to Part I. General description of high-voltage supplies. Physical descriptions and ratings of high-voltage supplies. Revisions in rectifier and auxiliary equipment. Equipment ratings and operating requirements. Service record. High-voltage-rectifier studies. Decell-supply electronic regulator. Changes in regulators. Electronic regulators: service record, maintenance, and studies. Equipment for personnel protection. Part II: Auxiliary Electrical Equipment. Introduction to Part II. Filament-supply equipment. Arc-supply equipment. Filament-arc regulators. Ion-source heater supply and control equipment. Experimental and theoretical studies. Miscellaneous motor controls. Ion-beam monitoring. Part III: Magnet Equipment. Introduction to Part III. Description of magnet systems. Detection and location of ground faults. Direct-current switchgear and protective equipment. Current monitoring. Current regulators. Index.

■ ENGINEERING DEVELOPMENTS IN THE GASEOUS DIFFUSION PROCESS (NNES)

Edited by Manson Benedict, Hydrocarbon Research, Inc., and Clarke Williams, Brookhaven National Laboratory. McGraw-Hill, 1949.

129 pp., 44 illus., 6¼ × 9¼. Available from University Microfilms as OP No. 13868. Microfilm, \$2.75; paper binding, \$5.25; library binding, \$7.25; plus shipping and handling charges.

A description of research and engineering developments relative to auxiliary devices necessary in the development of the gaseous diffusion process.

CONTENTS: Recording mass spectrometer for process analysis. Recording ionization chamber for traces of radioactive gases. Magnetic gear for torque transfer to a closed system. Mass spectrometers for leak detection. New developments in vacuum engineering. Theory of heat and mass transfer in batch condensation of solids. Absorption in a high-molecular-weight nonaqueous system: uranium hexafluoride in heavy oil. Continuous fluorine-disposal system. Reaction of fluorine oxide with sodium hydroxide. Author and subject indexes.

INSTRUMENTATION

■ ELECTRICAL CIRCUITS FOR CALUTRONS (NNES)

Edited by R. K. Wakerling, Radiation Laboratory, University of California, and A. Guthrie, U. S. Naval Radiological Defense Laboratory.

U. S. Atomic Energy Commission, 1949. 280 pp., 145 illus., 6 × 9. Available from University Microfilms as OP No. 6231. Microfilm, \$3.40; paper binding, \$10.20; library binding, \$12.45; plus shipping and handling charges. Also available from the Federal Clearinghouse as Report TID-5216. Microfilm, \$11.10; photostat, \$44.10.

A description of the various regulator systems that were developed for use as auxiliaries to the basic power-supply units to permit the attainment of a sufficiently high degree of voltage and current stabilization to meet the normal calutron operating requirements.

CONTENTS: General theory of regulator systems. High-voltage regulators. Arc regulation and temperature control. Magnet regulators. Miscellaneous electrical circuits. Index.

■ ELECTRONICS: Experimental Techniques (NNES)

By William C. Elmore, Swarthmore College, and Matthew Sands, Massachusetts Institute of Technology. McGraw-Hill, 1949.

417 pp., 182 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 13915. Microfilm, \$5.10; paper binding, \$15.25; library binding, \$17.50; plus shipping and handling charges.

A description of circuits designed for electronic instrumentation by the Electronics Group at Los Alamos Scientific Laboratory during 1943 to 1945.

CONTENTS: Circuit components and construction practice. Circuit elements. Voltage amplifiers. Electronic counters. Oscillographs and associated equipment. Test and calibration equipment. Power supplies and control circuits. Index.

■ HIGH-VOLTAGE PROBLEMS (NNES)

By J. D. Trimmer, Physics Department, University of Tennessee, and Harry Pearlman, North American Aviation, Inc. Edited by H. Wesley Savage, Carbide and Carbon Chemicals Company.

U. S. Atomic Energy Commission, 1951.

226 pp., 129 illus., $6\frac{1}{8} \times 9$. Available from University Microfilms as OP No. 6230. Microfilm, \$2.75; paper binding, \$7.90; library binding, \$10.15; plus shipping and handling charges. Also available from the Federal Clearinghouse as Report TID-5211. Microfilm, \$9.90; photostat, \$34.80.

An account of the work done in connection with the high-voltage systems used in the electromagnetic-separation process.

CONTENTS: Part I: High-voltage Sparking. Original equipment in relation to sparking. Extent and nature of sparking. Outage and contamination due to sparking. High-voltage cables and cable terminations. High-frequency transients. Part II: High-voltage Insulators. Introduction and general description. Conditions of calutron-insulator operation. Calutron insulators in the plant. Some engineering aspects of calutron insulators. Research on factors affecting insulator performance. General conclusions. Bibliography. Index.

■ IONIZATION CHAMBERS AND COUNTERS: Experimental Techniques (NNES)

By Bruno B. Rossi, Massachusetts Institute of Technology, and Hans H. Staub, Stanford University.

McGraw-Hill, 1949.

243 pp., 148 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 16858. Microfilm, \$9.15; plus shipping and handling charges.

A discussion of the fundamental features of ionization and the general properties of detectors based upon the ionization process. A

description is given of the construction of some typical detectors and their operation.

CONTENTS: Behavior of free electrons and ions in gases. Operation of ionization chambers with constant ionization. Operation of ionization chambers with variable ionization. Gas multiplication. Beta-ray, gamma-ray, and X-ray detectors. Alpha-particle detectors. Detectors for neutron recoils. Detectors of (n, α) and (n,p) reactions. Fission detectors. Index.

■ OPTICAL INSTRUMENTATION (NNES)

Edited by George S. Monk, University of Chicago, and W. H. McCorkle, Argonne National Laboratory.

McGraw-Hill, 1954.

262 pp., 123 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 13916. Microfilm, \$3.40; paper binding, \$10.10; library binding, \$12.35; plus shipping and handling charges.

A detailed discussion of the principles of design and institute research into the development of optical glasses to withstand the destructive effects of high-energy radiations, as well as of the use of plastic lenses in instruments of high quality and resolution.

CONTENTS: Optical problems in the Metallurgical Project. Optical instruments for viewing in irradiated areas. Miscellaneous instruments and services of the Project Optical Section. A standard periscope design for project purposes. Comparative tests of periscopic extenders. The erecting objective magnifier. Design of a Kellner type plastic objective. Achromat with positive element of two plastic field lenses. Borescopes in the project. Experiments on a borescope head. Periscope for discharge area of a pile. The binocular periscope. The corner periscope. A visual inspector for slugs. Underwater bar viewer. The peritelescope. Type D-A periscope. Type D-B periscope. The chemiscope. The sheffascope. Type A-A periscope. Type C-B periscope. The extenscope. Coloration of a standard periscope objective. Miscellaneous notes on coloration of optical materials. Coloration of optical glasses. The case for plastic lenses. An all-plastic optical system for project purposes. A new wide-angle all-plastic periscope. Scratch resistance of plastic optical materials. Light transmission through a water-filled tube. Report on smoke tester. Borescope cameras. Water-filled wide-angle viewers. Use of high-density radiation-absorbing solutions in optical instruments. Experiments on the evaporation of boron *in vacuo*. Some observations on controlled deposition of metals by cathode sputtering. Production of mirrors by the evaporation procedure. Grinding and polishing of metallic mirrors. Water-proof cements and their suitability in optical construction. Index.

ISOTOPE SEPARATION

■ CHEMICAL SEPARATION OF THE URANIUM ISOTOPES (NNES)

By Clyde A. Hutchison, Jr., Columbia University.

U. S. Atomic Energy Commission, 1952. 193 pp., 30 illus., 6 × 9. Available from the Federal Clearinghouse as Report TID-5224. Microfilm, \$6.54; Xerox, \$12.50.

A description of studies made at Columbia University to find a two-phase system suitable for countercurrent fractionation of the uranium isotopes.

CONTENTS: Theory and general discussion of the chemical separation of isotopes. Experimental details. Summary. Index.

■ DEVELOPMENTS IN THE CENTRIFUGE SEPARATION PROJECT (NNES)

By J. W. Beams, University of Virginia, A. C. Hagg, Westinghouse Electric Corp., and E. V. Murphree, Standard Oil Development Company.

U. S. Atomic Energy Commission, 1951. 269 pp., 65 illus., 6 × 9. Available from the Federal Clearinghouse as Report TID-5230. Microfilm, \$7.55; Xerox, \$16.00.

A discussion of the development programs undertaken to devise a gas-centrifuge process for concentrating U^{235} in UF_6 , the theory of separation with cascades of identical countercurrent units, early work at the University of Virginia, and the 42- and 132-in. centrifuges developed at Westinghouse and their operation.

CONTENTS: Part I: Centrifuge Separation Methods. Introduction to Part I. Evaporative-centrifuge method. Flow-through or concurrent method of centrifuging. Countercurrent-flow method applied to H_2 - CO_2 mixtures. Uranium-isotope separation by countercurrent refluxing using 32-in. tubular centrifuge. Uranium-isotope separation by countercurrent refluxing using 136-in. tubular centrifuge. Part II: The Westinghouse Gas Separators. Introduction to Part II. The 42-in. gas separator. The 132-in. gas separator. Part III: Large-scale Application of High-speed Gas Centrifuge. Introduction to Part III. Separation theory. Process design of centrifuge. Pilot-plant operation of gas centrifuge. Large-scale plant studies. Appendixes: continuous measurement of isotopes concentration; self-diffusion coefficient of uranium hexafluoride; thermal flowmeter for uranium hexafluoride; a thermomechanical method of concentrating isotopes. Index.

■ ELECTROMAGNETIC SEPARATION OF ISOTOPES IN COMMERCIAL QUANTITIES (NNES)

Edited by R. K. Wakerling, Radiation Laboratory, University of California, and A. Guthrie, U. S. Naval Radiological Defense Laboratory.

U. S. Atomic Energy Commission, 1949. 434 pp., 180 illus., 6 × 9. Available from University Microfilms as OP No. 10889. Microfilm, \$5.25; paper binding, \$15.65; library binding, \$17.90; plus shipping and handling charges. Also available from the Federal Clearinghouse as Report TID-5217. Microfilm, \$10.03; filmstrip, \$22.25.

A complete picture of the history and development of electromagnetic isotope separation.

CONTENTS: Part I: The Calutron. Basic considerations in the calutron process. Space-charge neutralization and studies of the beam plasma. Magnetic linear shims for beam focusing. Other magnetic shimming devices. Performance of magnetic shims and focal studies. Electric focusing devices. Focusing action of accelerating electrodes. The alpha 3 and 4 programs. Part II: The Isotron. Part III: Other Electromagnetic Separation Methods. The ionic centrifuge. The radial magnetic separator. The resonance method. The low-voltage method—grid slit systems. Index.

■ LIQUID THERMAL DIFFUSION (NNES)

Edited by Philip H. Abelson, Carnegie Institution of Washington, D. C., Nathan Rosen, University of North Carolina, and John I. Hoover, Naval Research Laboratory.

U. S. Atomic Energy Commission, 1958. 251 pp., 74 illus., 6 × 9. Available from the Federal Clearinghouse as Report TID-5229. Microfilm, \$8.91; Xerox, \$16.50.

A description of the liquid thermal-diffusion method for the separation of isotopes.

CONTENTS: Literature survey on liquid thermal diffusion to 1940; history from 1940 to 1945. Water solution work. The column. Experimental column studies. Engineering and operation. The pyramid. Approach to equilibrium by a single column. Effect of circulation. The continuous pyramid. Performance criteria. Columns in a pyramid. Design of small pyramids. Treatment of small pyramids approaching equilibrium. Stripper section. Nonuniform columns in parallel operation. Appendixes: uranium hexafluoride critical-temperature measurement; pressure-temperature-volume characteristics of uranium hexafluoride; viscosity of liquid uranium hexafluoride; measurement of dif-

fusion coefficient of uranium hexafluoride; corrosion of nickel by uranium hexafluoride at high temperatures. Bibliography (1940 to 1946). Index.

■ SEPARATION OF ISOTOPES IN CALUTRON UNITS (NNES)

Edited by H. Wesley Savage, Carbide and Carbon Chemicals Company.

U. S. Atomic Energy Commission, 1951.
437 pp., 214 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from the Federal Clearinghouse as Report TID-5233, Microfilm, \$11.10; photostat, \$66.60.

A description of the development of the operating units and their functions in the electromagnetic process of uranium isotope separation.

CONTENTS: Part I: Introduction. Electromagnetic process plant. Electromagnetic plant specifications. Production equipment and development at Clinton Engineering Works—Tennessee Eastman Corporation. Part II: Ion Sources. Development of the beta ion source. Performance of the beta ion source. Beta experimental sources. Alpha I ion sources. Alpha II ion sources. Part III: Ion Receivers. Introduction to ion receivers. Alpha I receivers. Alpha II receivers. Development of beta production receivers. Scraper type receivers. Deceleration type receivers. The receiver mechanism. Part IV: Liners. Part V: Stable-isotope Separation. Problems in adapting the calutron. Chemistry related to the separation of stable isotopes. Bibliography. Index.

■ THE THEORY OF ISOTOPE SEPARATION AS APPLIED TO THE LARGE-SCALE PRODUCTION OF U^{235} (NNES)

By Karl Cohen, The H. K. Ferguson Company.

McGraw-Hill, 1951.
165 pp., 34 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 6234. Microfilm, \$2.75; paper binding, \$6.40; library binding, \$8.65; plus shipping and handling charges.

A description of work done by the theoretical division of the Substitute Alloy Materials Laboratories, with emphasis placed on the general principles and concepts of the separation of uranium isotopes by gaseous diffusion.

CONTENTS: Ideal cascades. Square cascades. Equilibrium time of a square cascade. Determination of cascade constants. The control problem. Centrifuges. Other separation methods. Appendixes: roots of a transcendental equation; equilibrium time of square cascades for $N \sim 1$; the holdup function; Rayleigh distillation; properties of concurrent two-phase elements. Author and subject indexes.

METALLURGY

■ ADVANCED TECHNIQUES IN POWDER METALLURGY (AEC—ASM Monograph)

By Frances Clark, Stevens Institute of Technology, Hoboken, N. J.

Rowman and Littlefield, 1963.

180 pp., 61 illus., $6\frac{1}{8} \times 9\frac{1}{4}$. Paper binding, \$4.45; library binding, \$6.95.

A presentation of advanced techniques which treats the characteristics of powders from the standpoint of specific properties, discusses these metal powders used without consolidation, and suggests new methods of consolidating metal powders.

CONTENTS: Introduction. Characteristics of metal particles. Pure metal powders and alloy systems. Metal powders used without consolidation. Consolidation of metal powders. Sintering. Quality control during fabrication. Porous structures from metal powders. Dispersion strengthening. Magnetic materials from metal powders. Hard alloy powders. Toxicity and pyrophoricity of metal powders. Creep and dislocations. Trends. Appendix: precision elastic limit measurement technique for beryllium; standard method of test for apparent density of metal powders; standard method of test for flow rate of metal powders. Index.

■ CONSTITUTION OF URANIUM AND THORIUM ALLOYS

Compiled by F. A. Rough and A. A. Bauer, Battelle Memorial Institute.

U. S. Atomic Energy Commission, 1958.

138 pp., $8 \times 11\frac{1}{2}$. Available from the Federal Clearinghouse as Report BMI-1300. Microfilm, \$4.34; Xerox, \$10.50.

A publication that is divided into two major sections: uranium alloys and thorium alloys. Each section is preceded by a discussion of the transformation and melting temperatures of the basic metal. Binary and ternary systems are included. This publication supersedes "Compilation of US and UK Uranium and Thorium Constitution Diagrams" (Report BMI-1000).

■ FABRICATION OF CONTROL RODS FOR NUCLEAR REACTORS (AEC—ASM Monograph)

By William E. Ray, Westinghouse Electric Corp., Cheswick, Pa.

Rowman and Littlefield, 1963.

229 pp., 99 illus., $6\frac{1}{8} \times 9\frac{1}{4}$. Paper binding, \$4.45; library binding, \$6.95.

A monograph written for both nuclear and non-nuclear metallurgical workers. This mono-

graph is concerned primarily with specialized fabricating procedures for commercial power reactors, including a description of the working characteristics of materials used.

CONTENTS: Introduction. Boron stainless steels. Aluminum-boron alloys. Titanium-boron alloys. Dispersions of boron and its compounds in metal matrices. Cadmium and cadmium alloys. Silver-based alloys. Hafnium. Dispersions of rare-earth oxides in metallic matrices. Control rods utilizing metallic absorber materials. Control rods employing ceramic-pellet absorber materials. Control rods using ceramic-powder absorber material. Control-rod-quality assurance. Future control-rod production. Index.

■ IRRADIATION EFFECTS IN CLADDING AND STRUCTURAL MATERIALS (AEC-ASM Monograph)

By Spencer H. Bush, Pacific Northwest Laboratory.

Rowman and Littlefield, 1965.

225 pp., 58 illus., $6\frac{7}{8} \times 9\frac{1}{4}$. Paper binding, \$4.45; library binding, \$6.95.

A presentation of the state of the art in the field of irradiation damage to nuclear materials, restricted to metals used as fuel cladding or as structural components.

CONTENTS: Introduction. Mechanisms of irradiation damage. General description of irradiation damage. The stainless steels. Aluminum and magnesium alloys. Beryllium. Zirconium alloys. Nickel-base alloys. Refractory metals and alloys. Other metals for cladding or structures. Problems, programs, and future trends. Index.

■ LIQUID-METALS HANDBOOK (2nd edition)

Edited by R. N. Lyon, Oak Ridge National Laboratory. (Sponsored by Division of Reactor Development, Naval Reactors Branch, USAEC.)

U. S. Atomic Energy Commission, 1952.

269 pp., 126 illus., $7\frac{7}{8} \times 10\frac{1}{4}$. Available from University Microfilms as OP No. 4056. Microfilm, \$5.15; paper binding \$15.35; plus shipping and handling charges.

A revised and enlarged edition of the Handbook—one of a series sponsored by the Naval Reactors Branch—intended to stimulate industry to develop and use liquid metals and to stimulate further research on associated problems.

CONTENTS: Industrialization and utilization. Physical properties. Chemical properties and laboratory techniques. Corrosion of materials. Heat transfer. Experimental heat-transfer systems. Experimental heat-transfer-system components. Index.

■ LIQUID-METALS HANDBOOK: Sodium-NaK Supplement

Edited by Carey B. Jackson, Mine Safety Appliances Company.

U. S. Atomic Energy Commission, 1955.

445 pp., 237 illus., $7\frac{7}{8} \times 10\frac{1}{4}$. Available from University Microfilms as OP No. 10842. Microfilm, \$9.10; paper binding, \$27.20; library binding, \$29.95; plus shipping and handling charges.

A presentation of much of the technology of sodium and sodium-potassium systems for heat transfer in reactor engineering. This publication supplements the *Liquid-Metals Handbook*.

CONTENTS: Chemical and physical properties. Heat transfer. Chemical engineering. System design. Components. Safety and fire protection. Applications. Index.

■ MATERIALS FOR CONTROL ROD DRIVE MECHANISMS (AEC-ASM Monograph)

By George A. Freund, Western Nuclear Corporation.

Rowman and Littlefield, 1963.

209 pp., 19 illus., $6\frac{7}{8} \times 9\frac{1}{4}$. Paper binding, \$4.45; library binding, \$6.95.

A discussion of theories basic to the design of control-rod drive mechanisms which relates them to a specific application.

CONTENTS: Introduction. Functions and general features of the control-rod drive mechanism. Typical drive mechanisms for control rods. Compositions and general criteria of materials. Lubricants and hydraulic fluids. Corrosion and oxidation resistance. Stress corrosion. Wear resistance. Mechanical properties. Fabrication and processing. Magnetic and electric properties. Appendix: composition of cermets; composition of alloys; properties of high-temperature bearing materials. Bibliography. Index.

■ THE METAL BERYLLIUM

Edited by D. W. White, Jr., Knolls Atomic Power Laboratory, and J. E. Burke, Research Laboratory, General Electric Company. (Sponsored by Division of Reactor Development, Naval Reactors Branch, USAEC.)

American Society for Metals, 1955.

703 pp., 403 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$12.50.

A presentation of basic information on beryllium which covers all aspects of beryllium technology for the use of workers in the field, emphasizing possible uses of the metal in atomic energy work.

CONTENTS: Importance of beryllium. Ores. Reduction. Fabrication. Properties. The brittleness problem. Metallography. Corrosion. Alloys. Ceramics and ceramics. Health hazards. Analytical chemistry. Indexes.

■ THE METAL PLUTONIUM

Edited by A. S. Coffinberry and W. N. Miner, Los Alamos Scientific Laboratory.

Univ. of Chicago Press, 1961.

446 pp., 253 illus., $6\frac{1}{4} \times 9\frac{1}{2}$. Available from University Microfilms as OP No. 22838. Microfilm, \$6.10; paper binding, \$18.25; library binding, \$20.50; plus shipping and handling charges.

A carefully planned assemblage of papers by plutonium pioneers which should be, we believe, an essential volume in the libraries of scientists and engineers interested in the properties and applications of plutonium. The introductory section gives comprehensive background; the middle section covers physical metallurgy and projects at various laboratories; the concluding chapters describe applications in reactor fuels.

The scope is international, the authors being from Canada, France, Great Britain, and the United States. Recognition is given to Russian work to the extent that some published plutonium phase diagrams are reported and discussed. The papers contained in this book were given at the AEC/ASM World Metallurgical Congress in Chicago. With the help of authors, the editor completed updating the papers in 1960. This book was prepared with the cooperation of the American Society for Metals.

CONTENTS: Part I: Historical Review. The discovery of plutonium in the cyclotron. The first isolation of plutonium. The microscale preparation and micrometallurgy of plutonium metal. Plutonium metallurgy at Los Alamos during 1943 to 1945. Later plutonium metallurgical research at Los Alamos. Plutonium metallurgy at the Argonne National Laboratory. Studies on plutonium at Chalk River. Metallurgical studies on plutonium in Great Britain. Plutonium metallurgy in France. Part II: Plutonium Metallurgy. Crystal-structure studies of plutonium metal. The examination of plutonium metal by X-ray diffraction. The dilatometry and thermal analysis of plutonium metal. A dilatometric study of plutonium. Some physical properties of plutonium metal studied at Harwell. Results of measurements of physical properties of plutonium metal. Sound-velocity measurements on alpha-phase plutonium. Some physical and physicochemical properties of plutonium metal. The corrosion of plutonium. The micrography of plutonium. Radiography and autoradiography of plutonium. Phase diagrams of plutonium alloys studied at Harwell. Plutonium phase diagrams studied at Los Alamos.

Plutonium phase diagrams published by the Russians. Delta-prime plutonium. A review of the intermetallic compounds of plutonium. The preparation of plutonium-aluminum and other plutonium alloys. Part III: Plutonium in Nuclear Reactors. The role of plutonium in nuclear power. The preparation of plutonium-aluminum alloy fuel elements for the NRX reactor. The fabrication of billets containing plutonium for MTR fuel elements. The development of plutonium-containing fuels at the Argonne National Laboratory. Plutonium fuels for power reactors. The Hanford plutonium-recycle test-reactor design concept. A plutonium liquid-metal-fueled reactor. A fluid-fueled fast-power-reactor concept. A mixed-oxide concept for a plutonium-fueled power reactor. Index.

■ THE METAL THORIUM

Edited by H. A. Wilhelm, Iowa State College.

American Society for Metals, 1958.

397 pp., 179 illus., $6 \times 9\frac{1}{8}$, \$12.50.

A unified collection of detailed information on both the fundamental scientific and the technological and engineering aspects of thorium.

CONTENTS: Role of thorium metal in the nuclear field. Nonnuclear application of thorium. Thorium in magnesium technology. Production of thorium compounds. Preparation of thorium oxide and thorium fluoride from thorium nitrate. Development of the thorium tetrafluoride-calcium process for thorium metal. Preparation of iodide thorium. Consumable-electrode arc melting of thorium. Electrolytic refining of thorium. Physical constants, crystal structure, and thermodynamic properties. Electronic structure of thorium metal. Preferred orientation in thorium. Mechanical properties of thorium and high-thorium alloys. Recrystallization of thorium. Fabrication and cladding of thorium metal. Corrosion of thorium and its alloys. Effects of irradiation upon thorium. Metallography of thorium. Hazards associated with thorium metallurgy. Constitution of thorium alloys. Chemical analysis of thorium metal. Spectrographic analysis of thorium. Index.

■ THE METALLURGY OF HAFNIUM

Edited by D. E. Thomas, Bettis Plant, Westinghouse Electric Corp., and E. T. Hayes, Bureau of Mines, U. S. Department of the Interior. (Sponsored by Division of Reactor Development, Naval Reactors Branch, USAEC.)

U. S. Atomic Energy Commission, 1960.

384 pp., 119 illus., $5\frac{7}{8} \times 9\frac{1}{8}$. Available from GPO. Paper binding, \$1.50.

A reference work dealing with the science and technology of the extraction, fabrication, properties, and use of the metal hafnium. Individual chapters present information generally unavailable previously. The book follows the

natural sequence of functions involved in processing the ore through to a finished product.

CONTENTS: Applications. Extraction from ores. Reduction processes. Refining. Melting, fabrication, and shaping. Constitution of alloys. Physical metallurgy and properties. Analytical chemistry. Properties of compounds. Appendix: industrial hygiene and safety.

■ THE METALLURGY OF ZIRCONIUM (NNES)

Edited by Benjamin Lustman, Westinghouse Electric Corp., Atomic Power Division, and Frank Kerze, Jr., Division of Reactor Development, USAEC. (Sponsored by Division of Reactor Development, Naval Reactors Branch, USAEC.)

McGraw-Hill, 1955.

776 pp., 316 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$10.00.

Available from University Microfilms as OP No. 16857. Microfilm, \$9.27; plus shipping and handling charges.

A critical presentation of many aspects of zirconium technology.

CONTENTS: Zirconium and its application to nuclear reactors. Application for other uses. Occurrence. Production methods. Iodide-decomposition process for production. Melting and shaping of zirconium and its alloys. Joining and finishing. Physical metallurgy of zirconium and its alloys. Alloy system. Mechanical properties of zirconium and its alloys. Corrosion of zirconium and its alloys. Analytical chemistry. Appendixes: metallography; industrial hygiene and safety; engineering data sheets; glossary. Name and subject indexes.

■ NEUTRON ABSORBER MATERIALS FOR REACTOR CONTROL

By W. K. Anderson, Knolls Atomic Power Laboratory, General Electric Company; and J. S. Theilacker, Bettis Atomic Power Laboratory, Westinghouse Electric Corp.; contributions from other authorities. (Sponsored by Division of Reactor Development, Naval Reactors Branch, USAEC.)

U. S. Atomic Energy Commission, 1962.

862 pp., 379 illus., $5\frac{7}{8} \times 9\frac{1}{8}$. Available from GPO, \$3.00.

A well-illustrated book that reviews all available information on materials that are either currently being used or have potential use in the control of nuclear reactors.

CONTENTS: Neutron-absorbing materials and their application to nuclear reactors. Control-materials theory and calculations for thermal reactors. Hafnium. Boron materials. Silver and silver-base al-

loys. The lanthanons as reactor poisons. Control rods. Unshielded burnable poison materials and elements. Discrete, self-shielded, burnable poison elements. Index.

■ NUCLEAR GRAPHITE

Edited by R. E. Nightingale, Hanford Atomic Products Operation, General Electric Company.

Academic Press, 1962.

547 pp., 210 illus., $6\frac{1}{4} \times 9\frac{1}{2}$, \$15.80.

A book that brings together the physical, mechanical, thermal, and manufacturing properties of nuclear-grade graphite and the relation of radiation effects of each property. Nuclear graphite is used chiefly as moderator and reflector materials. In addition, this book discusses briefly the use of graphite with uranium as a nuclear fuel.

CONTENTS: Graphite in the nuclear industry. Manufacture. Machining practice. Nuclear properties. Structure. Physical properties. Theory of radiation effects in graphite. Irradiation techniques. Radiation-induced structural and dimensional changes. Radiation effects on electrical and thermal properties. Radiation effects on mechanical properties. Stored energy. Annealing radiation effects. Gas-graphite systems. Graphite-metal and graphite-molten-salt systems. Graphite-matrix fuels. Graphite-moderator design. Author and subject indexes.

■ NUCLEAR REACTOR FUEL ELEMENTS, METALLURGY AND FABRICATION

Edited by Albert R. Kaufmann, Nuclear Metals, Inc.

Interscience Publishers, 1962.

739 pp., 522 illus., $7\frac{1}{8} \times 10\frac{1}{8}$, \$27.00.

An indispensable volume for metallurgists and fabrication specialists interested in the production of nuclear-reactor fuel elements. Reactor engineers can obtain from it much useful information for conceptual design purposes.

CONTENTS: Energy from nuclear fission. Fuel-element problems. Uranium and its alloys. Plutonium and its alloys. Thorium and its alloys. Uranium dioxide and other ceramic fuels. Cladding materials. Interactions between core and cladding. Behavior of fissionable material under irradiation. Engineering aspects of fuel elements. Fabrication of core materials. Cladding and bonding techniques. Fuel subassembly concepts. Inspection and testing. Description and performance of operational fuel elements. Processing irradiated fuel elements. Fluid-fuel systems. Fuel-element economics. Appendixes: phase diagrams; fuel-element fabrication facilities; glossary. Index.

■ NUCLEAR REACTOR METALLURGY

By W. D. Wilkinson and W. F. Murphy,
International School of Nuclear Science
and Engineering, and W. J. McGonnagle,
Metallurgy Division, Argonne National
Laboratory.

D. Van Nostrand Co., 1958.
382 pp., 179 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$5.60.

A presentation of course material in applied reactor metallurgy developed at the International School of Nuclear Science and Engineering, Argonne National Laboratory.

CONTENTS: Uranium ores and ore treatments. Production of uranium metal. Structure and properties of uranium. Mechanical properties of uranium. Uranium alloys. Metallurgy of uranium. Thermal properties and heat treating of uranium. Fabrication of uranium. Powder metallurgy of uranium. Corrosion of uranium and other metals. Surface protection of uranium. Fabrication of fuel elements. Radiation damage in uranium. Metallurgy of plutonium. Metallurgy of thorium. Metallurgy of beryllium. Metallurgy of zirconium. Properties of liquid metals of interest in nuclear reactor. Ceramics in reactor technology. Metallic materials with large cross sections for thermal neutrons. Effects of neutron radiation of nonfissionable metals and alloys. Nondestructive testing of nuclear-reactor components. Index.

■ PHYSICAL METALLURGY OF URANIUM (1958 Geneva Conference)

By A. N. Holden, Vallecitos Atomic Laboratory, General Electric Company.
Addison-Wesley, 1958.

262 pp., 154 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 17581. Microfilm, \$3.25; paper binding, \$9.65; library binding, \$11.90; plus shipping and handling charges.

A comprehensive and unified treatment of the physical metallurgy of uranium in which the author summarizes, correlates, and critically evaluates the wealth of information that has become available in the field during the past several years. Although important experimental techniques and results are thoroughly described, emphasis has been placed upon interpretation in terms of fundamental properties and mechanisms.

CONTENTS: History, occurrence, and preparation of metal. Radioactivity and nuclear reactions, crystallography of uranium. Physical and chemical properties of uranium. Mechanical properties of uranium. Deformation of uranium. Recovery, recrystallization, and grain growth. Transformations in uranium and uranium alloys. Growth of uranium single crystals. Diffusion in uranium systems. Radiation damage to uranium. Thermal-cycling growth of uranium. Design of metallic fuel ele-

ments. Metallography of uranium. Appendix: uranium phase diagrams for binary systems.

■ QUALITY CONTROL IN FABRICATION OF NUCLEAR PRESSURE VESSELS (AEC-ASM Monograph)

By R. D. Wylie and W. J. McGonnagle,
Southwest Research Institute.

Rowman and Littlefield, 1965.
190 pp., 72 illus., 6×9 . Paper binding,
\$4.45; library binding, \$6.95.

A discussion of the ramifications of quality control in the design and fabrication of pressure vessels for nuclear applications.

CONTENTS: Quality control program. Management of quality control. Codes and specifications. Organization for quality control. Development of pressure vessels. Metallurgy of pressure vessels. Welding of pressure vessels. Forming of components. Heat treatment. Machining. Nondestructive testing. Radiography. Ultrasonic inspection. Inspection records and quality control. Economics of quality control. Index.

■ RADIATION EFFECTS ON TOUGHNESS OF FERRITIC STEELS FOR REACTOR VESSELS (AEC-ASM Monograph)

By L. P. Trudeau, The International Nickel Company of Canada, Ltd.,
Toronto, Ontario, Canada.

Rowman and Littlefield, 1964.
179 pp., 106 illus., $6\frac{1}{8} \times 9\frac{1}{4}$. Paper binding, \$4.45; library binding, \$6.95.

A discussion of how irradiation affects the toughness of ferritic steels. Emphasis is placed on current approaches for assessing the reduction of strength caused by notch effects and the mechanism of irradiation embrittlement. A theory of notch sensitivity that correlates the metallurgical and mechanical aspects of toughness is suggested.

CONTENTS: Introduction. Theoretical considerations. Effects of radiation on tensile and impact properties of steel. Effect of metallurgical variables on radiation damage. Dosimetry and correlation of test data. Tests and criteria for toughness of reactor vessels, including design considerations. Unsolved problems. Index.

■ RARE EARTH ALLOYS

By Karl A. Gschneidner, Jr., Los Alamos Scientific Laboratory.

D. Van Nostrand Co., 1961.
449 pp., 145 illus., 9×6 , \$12.75.

A review of the known rare-earth alloy systems undertaken in response to the rapidly increasing commercial and technological importance of these metals and their alloys.

A volume that should benefit the scientist who is primarily engaged in research in the field of metals. However, it will also be of interest to reactor engineers and physicists seeking information in this area.

This book is being translated into Russian.

CONTENTS: General considerations and electronic structure. Atomic properties and crystal structures. Transformation, melting temperatures, heats of transformation, and fusion. Vaporization and boiling-point data. Heat capacities and related functions. Magnetic, electrical, electronic, engineering, and mechanical properties. Miscellaneous properties. General alloying theory. Intra-rare-earth binary-alloy systems. Binary-alloy systems of a rare-earth metal with a non-rare element. Ternary alloy systems containing one and two rare-earth metals. Quaternary alloy systems containing one rare-earth metal. Structural details of the crystallographic species. Appendix: list of abbreviations and terms used in the book. Indexes.

■ THE RARE EARTHS

Edited by F. H. Spedding and A. H. Daane,

Iowa State University, Ames, Iowa.

John Wiley & Sons, 1961.

641 pp., 257 illus., $6\frac{1}{4} \times 9\frac{1}{2}$, \$14.75.

A book containing papers from a symposium on rare earths. The increasing interest in rare earths and their potential for expanded contributions to science and technology prompted the American Society for Metals and the AEC to sponsor this symposium. The symposium, held in Chicago in November 1959, was carefully planned so that the edited papers would constitute this book.

A number of companies are now producing rare earths commercially and, as described in this book, many rare earths have actual or potential applications in industry.

This book is being translated into Russian.

CONTENTS: Historical introduction. Chemistry, occurrence, and strategic supply of the rare earths. Separation of the rare earths by fractional crystallization, by liquid-liquid extraction, and by ion exchange. Preparation of the rare-earth fluorides. Rare-earth and yttrium halides (chlorides, bromides, and iodides) for metal production. Metallothermic preparation of rare-earth metals. Rare-earth electrolytic metals. Refining, purification, and mechanical fabrication of rare-earth metals. Physical properties, crystallography, and metallography of the rare-earth metals. Rare-earth metal-phase diagrams. Principles of alloying behavior of rare-earth metals. Mechanical properties of yttrium, scandium, and the rare-earth metals. Rare-earth metals in magnesium technology. Applications of rare earths to ferrous and nonferrous alloys. Nonnuclear, nonmetallic uses of rare earths.

Nuclear applications of yttrium and the lanthanons. Analytical chemistry and spectroscopy of rare earths. Index.

■ THORIUM PRODUCTION TECHNOLOGY (1958 Geneva Conference)

By F. L. Cuthbert, National Lead Company of Ohio.

Addison-Wesley, 1958.

303 pp., 76 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 17584. Microfilm, \$3.75; paper binding, \$11.15; library binding, \$13.40; plus shipping and handling charges.

A book that contains practically all the information currently available on thorium-production technology.

CONTENTS: Thorium: history, sources, and uses. Properties of thorium. Thorium-bearing ores; their deposits and methods of concentration. Extraction of thorium from ores. Purification of thorium concentrates. Preparation of thorium metal by reduction. Melting and casting of thorium. Fabrication of thorium. Health and safety aspects of thorium production. Testing procedures.

■ URANIUM DIOXIDE: PROPERTIES AND NUCLEAR APPLICATIONS

Edited by J. Belle, Bettis Plant, Westinghouse Electric Corp.; contributions from other authorities. (Sponsored by Naval Reactors Branch, Division of Reactor Development, USAEC.)

U. S. Atomic Energy Commission, 1961.

726 pp., 292 illus., $5\frac{7}{8} \times 9\frac{1}{8}$. Available from University Microfilms as OP No. 16927. Microfilm, \$8.70; paper binding, \$26.15; library binding, \$28.40; plus shipping and handling charges.

A handbook presenting information acquired from the development of uranium dioxide as a reactor fuel and from the use of dioxide fuel elements. Includes experience of Bettis Plant and its suppliers in obtaining, fabricating, and testing the material.

CONTENTS: Uranium dioxide and its application to nuclear reactors. Preparation, characterization, and fabrication of uranium dioxide. Its physical properties. Phase relations in $\text{UO}_2\text{-U}_3\text{O}_8$ system. Solid-state reactions. Oxidation and corrosion. Irradiation behavior. Metallography.

■ URANIUM METALLURGY

(In 2 volumes)

By W. D. Wilkinson, International Institute of Nuclear Science and Engineering, Argonne National Laboratory.
Interscience Publishers, 1962.

□ Volume I: *Uranium Process Metallurgy*

755 pp., 353 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$21.00.

A comprehensive review of uranium process metallurgy. Includes information pertinent to the metallurgical processing of uranium ores and metal and to safe practice in uranium metallurgy. Some aspects of processing uranium alloys are included.

CONTENTS: Uranium-ore processing. Reduction and purification of uranium. Uranium fabrication. Powder metallurgy of uranium. Reprocessing fuel material. Safe practice in uranium metallurgy. Appendixes: uranium minerals; thermodynamic data of interest in uranium metallurgy; liquid-liquid extraction processes and solvents. Index.

□ Volume II: *Uranium Corrosion and Alloys*

743 pp., 362 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$18.75.

An assembly of most of the important information on uranium corrosion and uranium alloys of significance to metallurgists.

CONTENTS: Corrosion of uranium: corrosion of massive uranium by air; mechanisms of corrosion by gases; corrosion of uranium in moist atmosphere; aqueous corrosion of uranium; corrosion by nonaqueous liquids. Uranium alloys: general considerations; compound-free systems; uranium-nonmetal systems; low-miscibility systems with intermetallic compounds; highly gamma-miscible systems. Appendixes: thermodynamic data for certain reactions involved in the corrosion and oxidation of uranium; various uranium-alloy etchants; crystallographic data for binary uranium compounds; uranium phase diagrams for binary alloys. Index.

■ URANIUM PRODUCTION TECHNOLOGY

Edited by C. D. Harrington and A. E. Ruehle, Mallinckrodt Chemical Works; contributions from other authorities.
D. Van Nostrand Co., 1959.
550 pp., 346 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, about \$17.50.

A presentation of the entire field of technology in the United States of uranium-metal production from uranium concentrates or high-grade uranium ore. Limited amounts of history, pertinent production details, and development work are included. This comprehensive book, the first in its field, includes work done at many AEC installations throughout this coun-

try. It is written for the student of metallurgy both in an academic institution and in industry.

CONTENTS: Chemistry of uranium processing. Diethyl ether solvent-extraction process. Tributyl phosphate solvent-extraction process. Producing uranium trioxide. Producing uranium dioxide. Producing uranium tetrafluoride. Producing uranium metal by reduction and casting. Producing dingot uranium metal. Process physical metallurgy of uranium. Fabricating uranium metal-press forging in alpha range. Fabricating uranium metal; primary extrusion; rolling and slug machining. Producing and fabricating high uranium alloys. Producing uranium hexafluoride and enriched compounds and metals. Recent work in uranium technology. Health-hazard control. Index.

■ URANIUM TECHNOLOGY (NNES)

By J. E. Vance, consultant, New York Operations Office, and J. C. Warner, consultant, Argonne National Laboratory.

U. S. Atomic Energy Commission, 1951.
238 pp., 8 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from the Federal Clearinghouse as Report TID-5231. Microfilm, \$7.13; Xerox, \$15.90.

A review of the technological development that resulted in the production of uranium as a commercial commodity in accordance with rigid specifications of chemical purity and physical form.

CONTENTS: Extraction of uranium from domestic uranium-ore concentrates and from pitchblende and torbernite ores by the sulfuric acid process. Preparation of pure U_3O_8 from crude U_3O_8 and from sodium diuranate, of pure UO_3 directly from pitchblende ores, and of pure uranium compounds from pure uranyl nitrate hexahydrate. Early methods for producing uranium metal. Methods for production of uranium metal. Large-scale melting and casting of uranium metal. Recovery of uranium from residues and scrap materials. Miscellaneous problems. Index.

■ WELDING AND BRAZING TECHNIQUES FOR NUCLEAR REACTOR COMPONENTS (AEC-ASM Monograph)

By Gerald M. Slaughter, Oak Ridge National Laboratory.
Rowman and Littlefield, 1964.
194 pp., 88 illus., $6\frac{1}{8} \times 9\frac{1}{4}$. Paper binding, \$4.45; library binding, \$6.95.

A description of welding and brazing techniques for nuclear reactor components, including fuel elements, pressure and containment vessels, heat exchangers, and piping. The book concludes with a discussion of methods for repairing equipment, including remote joining and cutting techniques.

CONTENTS: Introduction. Slugs and tubular fuel elements. Plate type fuel elements. Pressure and containment vessels. Heat exchangers. Piping. Remote joining and cutting. Index.

PHYSICS

■ THE ADIABATIC MOTION OF CHARGED PARTICLES

By Theodore G. Northrop, Lawrence Radiation Laboratory, University of California.

Interscience Publishers, 1963.

109 pp., 24 illus., $8\frac{1}{4} \times 5\frac{1}{2}$, \$5.95.

A book that presents methods of determining charged-particle trajectories by the theory of the guiding center motion and the adiabatic invariants. Adiabatic approximation is of utmost importance, especially to the study of plasma physics and particle motion in space and in the terrestrial (Van Allen) radiation belts.

CONTENTS: Introduction. The guiding center motion. A more formal derivation of the nonrelativistic guiding center equation. The adiabatic invariants of the motion. Additional applications of adiabatic theory. Nonadiabatic behavior. Index.

■ THE CHARACTERISTICS OF ELECTRICAL DISCHARGES IN MAGNETIC FIELDS (NNEs)

Edited by A. Guthrie and R. K. Wakerling, Radiation Laboratory, University of California.

McGraw-Hill, 1949.

376 pp., 236 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 13366. Microfilm, \$4.65; paper binding, \$13.90; library binding, \$15.90; plus shipping and handling charges.

A presentation of the results of studies at the Radiation Laboratory, University of California, on the characteristics of electrical discharges in magnetic fields, particularly discharges in the vapors of uranium compounds.

CONTENTS: Qualitative description of arc plasma in a magnetic field. Use of probes for plasma exploration in strong fields. Minimum ionic kinetic energy for a stable sheath. Theoretical considerations regarding minimum pressure for stable arc. Experimental investigation of threshold pressure for stable-arc operation. Measurements of the absolute values of the cross sections for ionization of uranium tetrachloride and uranium hexafluoride by electrons. Ionization and dissociation of uranium tetrachloride and hexafluoride by electron impact. Rate of ion production by an electron beam. Study

of arc plasma. Theory and operation of a Philips ionization-gauge type discharge. Index.

■ CONTROLLED THERMONUCLEAR REACTIONS (An Introduction to Theory and Experiment)

By Samuel Glasstone, consultant to the USAEC, and R. H. Lovberg, Los Alamos Scientific Laboratory.

D. Van Nostrand Co., 1960.

530 pp., 180 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$5.60.

A book written primarily to provide the necessary background for physicists and engineers planning to enter the field of research in controlled thermonuclear reactions. Treatment of subject is directed largely to experimentalists. However, sufficient theory is introduced to enable the reader to appreciate the principles underlying the observed phenomena.

This book is being translated into German.

CONTENTS: Physical conditions for thermonuclear reactions. Possible approaches to controlled fusion. Elementary plasma theory. Formation and heating of plasma. Plasma diagnostic techniques. The pinch effect. The stellarator. Magnetic-mirror systems. The Astron system. Miscellaneous proposals for plasma confinement and heating. Energy losses and scaling laws. Plasma-stability theory. Index.

■ DETERMINATION OF THE ISOTOPIC COMPOSITION OF URANIUM (NNEs)

By A. E. Cameron, K-25 Laboratories, Carbide and Carbon Chemicals Corporation.

U. S. Atomic Energy Commission, 1950.

166 pp., 63 illus., 6×9 . Available from the Federal Clearinghouse as Report TID-5213. Microfilm, \$5.33; Xerox, \$12.50.

A description of the use of mass spectrometry and counting to determine the isotopic composition of uranium ranging from highly impoverished material to material highly enriched in the U^{235} isotope.

CONTENTS: Part I: Mass Spectrometry. Introduction. Sample preparation. Spectrometer tube. Electronics and vacuum system. Operating methods. Factors affecting accuracy. Scanning methods. Maintenance methods. Critical ionization potential of uranium hexafluoride. Part II: Counting. Introduction. Sample preparation and purity. Alpha-counting equipment. Fission counting. Calibration and calculations. Appendixes: capacity of laboratory; bibliography. Index.

■ INTRODUCTION TO NONLINEAR DIFFERENTIAL AND INTEGRAL EQUATIONS

By Harold T. Davis, Northwestern University.

U. S. Atomic Energy Commission, 1960.
566 pp., 135 illus., $5\frac{7}{8} \times 9\frac{1}{8}$. Available from GPO, \$2.00. Also available from Dover Publications, \$2.00.

A presentation of a general survey of the problem presented by nonlinear equations; classical theories of integration, the integrating factor, particular equations, and the problem of singular solutions; critical examination of existence theorems and the algorithms they contain; and Volterra's theory of the growth of conflicting populations and the problem of pursuit. Also included is a discussion of a number of classical equations and their solutions.

CONTENTS: Introduction. The differential equation of first order. The Riccati equation. Existence theorems. An introduction to second-order equations: the problems of conflict and pursuit. Elliptic integrals and functions and theta functions. Second-order differential equations. Second-order differential equations in the polynomial class. Continuous analytic continuation. The phase plane and its phenomena. Nonlinear mechanics. Some particular equations. Nonlinear integral equations. Problems from the calculus of variations. The numerical integration of nonlinear equations. Appendixes: types of equations with fixed critical points; elements of the linear fractional transformation; coefficients of the expansion of the first and second Painlevé transcendents. Tables: values of the first and second Painlevé transcendents; solutions of the Van der Pol and the Volterra equations. Bibliography. Name and subject indexes.

■ INTRODUCTION TO THE THEORY OF NEUTRON DIFFUSION (Volume I)

By K. M. Case, University of Michigan, F. de Hoffmann, Los Alamos Scientific Laboratory, and G. Placzek, Institute for Advanced Study.

U. S. Atomic Energy Commission, 1953.
174 pp., 45 illus., $8\frac{3}{4} \times 10\frac{1}{2}$. Available from GPO, \$1.25.

A detailed discussion of the general equations of one-velocity neutron-diffusion theory and of their solution for the special case of a homogeneous infinite medium with isotropic scattering.

CONTENTS: Streaming in vacuum. Purely absorbing medium. Equations for a general medium. Uniform infinite medium with isotropic scattering. Application of the results obtained for the uniform infinite medium to the solution of finite problems. Appen-

dices: the functions $E_n(x) = \int_1^\infty e^{-xu} u^{-n} du$; relations between isotropic point-, plane-, and shell-source problems for uniform infinite media; transformation of the isotropic point-source solution; transformation of the anisotropic plane-source solution.

■ MAGNETS AND MAGNETIC MEASURING TECHNIQUES (NNES)

Edited by R. K. Wakerling, Radiation Laboratory, University of California, and A. Guthrie, U. S. Naval Radiological Defense Laboratory.

U. S. Atomic Energy Commission, 1949.
213 pp., 122 illus., 6×9 . Available from University Microfilms as OP No. 6232. Microfilm, \$2.75; paper binding, \$7.90; library binding, \$10.15; plus shipping and handling charges. Also available from the Federal Clearinghouse as Report TID-5215. Microfilm, \$9.90; photostat, \$34.80.

A discussion of the theory and design of magnets with particular reference to the design of calutron magnets.

CONTENTS: Some basic considerations regarding magnet design requirements. Magnetic measuring instruments and techniques. Model magnets and their performance. Magnetic tests on full-scale magnets. Index.

■ A MANUAL OF EXPERIMENTS IN REACTOR PHYSICS

Contributing editor, Frank A. Valente, Rensselaer Polytechnic Institute.
The Macmillan Co., 1963.
335 pp., 100 illus., 6×9 , \$7.50.

A laboratory manual describing the laboratory procedure used at Rensselaer Polytechnic Institute and detailing 23 subcritical reactor experiments involving the theory and practice of reactor physics.

The manual consists of two parts. Part I, Basic Elements of Theory and Practice, summarizes the essential at-hand information appropriate to the experiments that are discussed and described in the manual; and Part II, Experiments, presents 23 experiments that are divided into three groups: (1) experiments requiring only steady sources of neutrons, (2) experiments requiring a subcritical assembly and a steady source of neutrons, and (3) experiments requiring a sigma pile or a subcritical assembly and a pulsed source of neutrons.

The text is well illustrated and contains tabulations of experimental data and a number of classical equations and their solutions.

CONTENTS: Statistics of counting. Radioactivity. Instrumentation. The technique of pulsed-neutron sources. Radiological considerations. Experiments. Index.

■ MISCELLANEOUS PHYSICAL AND CHEMICAL TECHNIQUES OF THE LOS ALAMOS PROJECT: Experimental Techniques (NNES)

Edited by Alvin C. Graves and Darol K. Froman, Los Alamos Scientific Laboratory.

McGraw-Hill, 1952.

323 pp., 169 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 6226. Microfilm, \$3.95; paper binding, \$11.80; library binding, \$14.05; plus shipping and handling charges.

A record of developments resulting from experimental work at Los Alamos Scientific Laboratory during World War II.

CONTENTS: Preparation of foils. Neutron sources. The modulated betatron. Modulation and other techniques used with ion accelerators. Topics on vacuum technique. Optical methods and instruments. Index.

■ NAVAL REACTORS PHYSICS HANDBOOK

□ Volume I: *Selected Basic Techniques*

Edited by A. Radkowsky, Naval Reactors Branch, Division of Reactor Development, USAEC.

U. S. Atomic Energy Commission, 1964.

1545 pp., 463 illus., 6×9 . Available from GPO as Report TID-7031, \$6.00.

A handbook that presents the most pertinent parts of the physics knowledge gained in the Naval and Shippingport (PWR) reactor programs. It is written for those interested in nuclear core design and brings together basic theoretical and experimental material of especially wide interest, including those common to both thermal- and intermediate-neutron energy reactor types.

CONTENTS: Reactor physics and its application to nuclear power reactors. The neutron slowing-down problem. The neutron thermalization problem. Reactor design techniques. Reactor kinetics. Comparisons of integral experiments with theory. Reactor physics computation. Contributing authors. Index.

□ Volume III: *The Physics of Intermediate Spectrum Reactors*

Edited by J. R. Stehn, Knolls Atomic Power Laboratory. (Sponsored by Naval Reactors Branch, Division of Reactor Development, USAEC.)

U. S. Atomic Energy Commission, 1958.

506 pp., 255 illus., $7\frac{7}{8} \times 10\frac{1}{4}$. Available from GPO. Paper binding, \$3.00.

An accumulation of physics information obtained from the work on intermediate-spectrum reactors at Knolls Atomic Power Laboratory. The material covers the importance of the properties of critical assemblies and of techniques for obtaining related experimental information; the uses of critical assemblies and reactor theory in making and testing predictions of reactivity variation during operation; the spread of heat resulting from the presence of beryllium or sodium in the reactor; the transient or near transient behavior of intermediate reactors.

CONTENTS: The physics of intermediate spectrum reactors. The critical-assembly program. Design of critical assemblies. Inverse multiplication techniques. Methods of calibrating control rods. Activation experiments. Reactivity-coefficient systematics. Reactivity coefficients and self-shielding measurements. Application of pile oscillation techniques to the measurement of reactivity coefficients. Reactivity effects associated with reactor operation. Reactor-survey calculations. Self-shielding calculations for SIR type reactors. Statistical-theory estimation of fission-product poisoning. A xenon calculation procedure adaptable to digital computers. Prediction of fission-product poisoning. Evaluation of SIR type reflector control in critical assemblies. Burnable-poison calculations for intermediate reactors. Critical-assembly investigation of burnable poisons. Two-dimensional (r - θ) multi-group analysis of a SIR type reactor. Estimation of reactor endurance characteristics by critical experiments. Loading, nuclear testing, and power operation of the S1G. Heat-generation and nuclear-materials problems. Power-distribution measurements on critical assemblies. Gamma-ray and neutron heat generation. Gamma-ray-heating measurements in the PPA. Decay heat and activity. Photoneutrons in beryllium-moderated reactors. Poisoning by Li^6 growth in the moderator. Reactor kinetics and temperature coefficients. Isothermal temperature-coefficient measurements in the PTR. Calculation of temperature coefficients resulting from structural expansions. Temperature and power coefficients in the power reactor. Reactor thermal spectrum. The calculation of Doppler temperature coefficients. Measurement of Doppler coefficient by oscillatory heating. Critical-assembly kinetics studies by oscillator technique. Measurement of power coefficients by pile oscillator. Temperature effects from rod-drop experiments. Methods for comparison of temperature coefficient for rod-drop and pile-oscillator experiments. Analog calculation of a runaway. Index.

■ NEUTRON CROSS SECTIONS

By Donald J. Hughes and Robert B. Schwartz, Brookhaven National Laboratory.

U. S. Atomic Energy Commission, 1958. 373 pp., 292 illus., $10\frac{1}{2} \times 15\frac{5}{8}$. Available from GPO as Report BNL-325 (2nd edition), \$4.50. Supplement 1, published in 1960, is also available: 130 pp., 86 illus., $10\frac{1}{2} \times 15\frac{5}{8}$, \$2.00. Supplement 2, appearing in three volumes, will be available from GPO as each volume is completed. Volume 1 ($Z = 1 - 20$) was published in 1964: 250 pp., approximately 130 illus., $8\frac{1}{2} \times 11$, \$2.50. Volume 2 ($Z = 21 - 87$) will probably not be published until 1966. Volume 3 ($Z = 88 - 100$) will be published in 1965.

A compilation designed to meet the needs of reactor physicists for cross-section curve data emphasizing the energy range appropriate for pile neutrons and cross sections at thermal energy.

CONTENTS: Thermal cross sections. Resonance parameters. Cross-section curves.

■ 1959 NUCLEAR DATA TABLES

Edited by K. Way, National Research Council—National Academy of Sciences. U. S. Atomic Energy Commission, 1959. 151 pp., $7\frac{7}{8} \times 10\frac{1}{4}$. Available from GPO, \$1.00.

Contains ten tables in diverse fields of low-energy physics.

CONTENTS: Supplement to directory to nuclear data tabulations. Elastic and inelastic scattering of charged particles. Ground-state-neutron threshold energies. Ground-state Q values. Relative isotopic abundances. Mass differences and ratios. Neutron cross sections. Neutron strength functions. Nuclear moments. Table of (p, γ) resonances.

■ 1960 NUCLEAR DATA TABLES (In 4 volumes)

Edited by K. Way, National Research Council—National Academy of Sciences. U. S. Atomic Energy Commission.

- Part 1, 214 pp., \$1.50, 1961.
 - Part 2, 456 pp., \$2.75, 1961.
 - Part 3, 181 pp., \$1.25, 1960. Out of print.
 - Part 4, 249 pp., \$1.50, 1961.
- $7\frac{7}{8} \times 10\frac{1}{4}$. Available from GPO.

A presentation of nuclear data tables in four parts. Parts 1 and 2 present reaction Q values computed from masses obtained from a new least-squares adjustment based on the most

accurate experimental results of nuclear-reaction work, beta disintegration, and mass-spectroscopic studies. Part 3 presents a collection of 69 graphs exhibiting range-energy relations, cross sections for neutron production, crystal efficiencies, conversion factors, calibration energies, and other data frequently needed in nuclear-reaction studies. Part 4 presents a compilation of recent experimental results on nuclear radii, beta disintegration energies, nuclear scattering, neutron thresholds, gamma-ray energies, thermal-neutron cross sections, nuclear moments, reaction Q values, and a second supplement to the *Directory to Nuclear Data Tabulations*.

CONTENTS: Part 1: Consistent set of Q values I, $A \leq 66$. Part 2: Consistent set of Q values II, $67 \leq A \leq 199$. Part 3: Nuclear-reaction graphs. Part 4: Short tables.

■ NUCLEAR THEORY REFERENCE BOOK

Nuclear Data Project, National Academy of Sciences—National Research Council. U. S. Atomic Energy Commission.

- For 1957 and 1958, 136 pp., \$1.00, 1963.
 - For 1959 and 1960, 152 pp., \$1.00, 1963.
 - For 1961 and 1962, 169 pp., \$1.25, 1963.
- $7\frac{7}{8} \times 10\frac{1}{4}$. Available from GPO.

Each publication is a compilation of the *Nuclear Theory Index Cards* issued yearly on subscription basis by NAS—NRC. These cards represent a cumulative index system for theoretical papers in the field of low-energy physics. Each card contains the title of the article, the authors' names and affiliations, the number of figures and tables in the paper, and the bibliographic reference.

CONTENTS: Nuclear structure. Nuclear reactors. Electromagnetic radiation. Beta decay and parity. Alpha decay. Tables and computational aids. Special topics. Author index.

■ PRINCIPLES OF CYCLIC PARTICLE ACCELERATORS

By John J. Livingood, Argonne National Laboratory.

D. Van Nostrand Co., 1961. 392 pp., 162 illus., 6×9 , \$10.75.

A coherent discussion of existing varieties of cyclic particle accelerators—cyclotrons, synchrocyclotrons, synchrotrons, betatrons, microtrons, linear accelerators, and isochronous and stochastic machines. This book describes these accelerators in sufficient detail to show their principles of operation, similarities, differences, and limitations.

CONTENTS: Preliminary considerations. Orbit stability. Matrix method of calculating stability.

Edge focusing. Resonances. Phase stability. Fixed-frequency cyclotrons. Synchrocyclotrons. Synchrotrons. Betatrons. Microtrons. Alternation-gradient synchrotrons. Fixed-field alternating-gradient accelerators. Linear accelerators. Quadrupole lenses. Stochastic accelerators. Index.

■ PROBLEMS OF PHYSICS IN THE ION SOURCE (NNES)

By Arthur H. Barnes, Argonne National Laboratory, S. M. MacNeille, Eastman Kodak Company, and Chauncey Starr, North American Aviation, Inc.

U. S. Atomic Energy Commission, 1951.
294 pp., 185 illus., 6×9 . Available from University Microfilms as OP No. 6229. Microfilm, \$3.50; paper binding, \$10.60; library binding, \$12.85; plus shipping and handling charges. Also available from the Federal Clearinghouse as Report TID-5219. Microfilm, \$11.10; photostat, \$45.60.

A presentation of the fundamental processes involved during operation of the calutron source units at Clinton Engineer Works and a description of the experiments that enabled the investigators to determine them.

CONTENTS: Part I: Production of Ions in the Calutron. Introduction. Cathodes and defining slots. Production-improvement studies. Accelerating system and ion beams. Part II: Vapor Production and Control. Vapor production. Vapor control. Vapor-flow measurement. Problems associated with vapor production. Charge studies. External feed systems. Part III: Electron Drain. Nature of electron drain. Drain-control systems. Ceramic drain control. Bibliography. Index.

■ PRODUCTION AND SEPARATION OF U^{233} . COLLECTED PAPERS (PARTS 1 AND 2) (NNES)

Edited by Leonard I. Katzin, Argonne National Laboratory.

U. S. Atomic Energy Commission, 1952.
728 pp., 200 illus., 6×9 . Available from the Federal Clearinghouse as Report TID-5223. Microfilm, \$22.43; Xerox, \$31.00. Parts not available separately.

The assembled record of significant work relating to U^{233} which was done on the Manhattan Project.

■ PRODUCTION AND SEPARATION OF U^{233} . SURVEY (NNES)

Edited by Glenn T. Seaborg, Radiation Laboratory, University of California, and Leonard I. Katzin, Argonne National Laboratory.

U. S. Atomic Energy Commission, 1951.
244 pp., 20 illus., 6×9 . Available from the Federal Clearinghouse as Report TID-5222. Microfilm, \$6.98; Xerox, \$15.00.

A survey of the properties of U^{233} and the methods of its production.

CONTENTS: Introduction. U^{233} in atomic power. Methods of separation. Aspects of large-scale production of U^{233} . Chemical purification. Protactinium chemistry. Chemistry of thorium. Thorium metallurgy. Nuclear properties of uranium, protactinium, and thorium isotopes. Index.

■ PROJECT SHERWOOD: The U. S. Program in Controlled Fusion (1958 Geneva Conference)

By Amasa Bishop, European Scientific Representative, USAEC.
Addison-Wesley, 1958.

216 pp., 50 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 17579. Microfilm, \$3.00; paper binding, \$7.95; library binding, \$10.20; plus shipping and handling charges.

An account of the extensive research and development undertaken by the AEC for harnessing the energy of thermonuclear reactions. It presents a factual and readable account of Project Sherwood, including its origin, its development, its problems, and the outlook for its eventual success. The book describes the basic principles involved in a fusion reaction and the various methods now being studied to control thermonuclear energy, with the hope of eventually producing net power.

This book has been translated into French and Italian.

CONTENTS: Basic principles of controlled fusion. The problem of confinement. The pinch program (part I). The stellarator program (part I). The magnetic-mirror program (part I). Development of other projects (part I). The coordination and administration of the Sherwood program (part I). Plasma diagnostics. The question of stability. The pinch program (part II). The stellarator program (part II). The magnetic-mirror program (part II). The molecular ion ignition program. The cusped-geometry program. Shock-wave experiments. The Astron program. Development of other projects (part II). Coordination and administration of the Sherwood program (part II). Summary and outlook. Appendixes: several fundamental topics of physics; low-temperature fusion; thermonuclear reactions in the sun and other stars; unpromising approaches; glossary of terms; glossary of symbols; participation in Sherwood conferences; bibliography of selected readings; persons associated with the Sherwood project; charts giving data on representative models of the pinch, stellarator, and magnetic-mirror programs. Index.

■ REACTOR PHYSICS CONSTANTS

Prepared by Argonne National Laboratory.

U. S. Atomic Energy Commission, 1963.
850 pp., 482 illus., $9\frac{3}{8} \times 11\frac{5}{8}$. Available from GPO as Report ANL-5800 (2nd edition), \$6.00.

A compilation of the latest and best values of the data, constants, recipes, formulas, etc., necessary to reactor calculations.

CONTENTS: Fission properties. Selected cross-section data. Constant for thermal homogeneous reactors. Lattice constants for thermal heterogeneous systems. Control and dynamics of thermal reactors. Intermediate reactor. Fast reactors. Shielding constants. Constants related to interpretation of experimental data. Digital-computer codes. Subject index.

■ SOURCES AND COLLECTORS FOR USE IN CALUTRONS (NNES)

Edited by R. K. Wakerling, Radiation Laboratory, University of California, and A. Guthrie, U. S. Naval Radiological Defense Laboratory.

U. S. Atomic Energy Commission, 1949.
273 pp., 118 illus., 6×9 . Available from University Microfilms as OP No. 6228. Microfilm, \$3.30; paper binding, \$9.85; library binding, \$12.10; plus shipping and handling charges. Also available from the Federal Clearinghouse as Report TID-5218. Microfilm, \$11.10; photostat, \$42.60.

An account of the theory and design of the various ion sources and collectors used in calutrons at the Radiation Laboratory, University of California.

CONTENTS: Design factors with relation to ion theory. Mechanical design of the ion source. Charge materials and operation. Full-energy collectors. Deceleration collectors. Index.

■ SPECTROSCOPIC PROPERTIES OF URANIUM COMPOUNDS (NNES)

By G. H. Dieke, The Johns Hopkins University, and A. B. F. Duncan, University of Rochester.
McGraw-Hill, 1949.

290 pp., 22 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 10890. Microfilm, \$3.60; paper binding, \$10.80; library binding, \$13.05; plus shipping and handling charges.

A discussion of the spectra and preparation of a number of uranium compounds.

CONTENTS: Part I: Experimental Procedure. X-ray analysis of the crystal structure of uranyl compounds. General features of the fluorescence and absorption spectra of uranyl compounds. Intensity measurements. Observations. Miscellaneous uranium compounds. Part II: Synthesis of Uranyl Compounds. Preparation of other uranium compounds. Problems in synthesis. Growth of crystals. Conclusions and suggestions. Appendixes: tables of wavelength measurements; special preparations and apparatus; miscellaneous contributions to the chemistry of uranium. Bibliography. Index.

■ UTILIZATION OF HEAVY WATER (NNES)

By Isidor Kirshenbaum, Standard Oil Development Company.

U. S. Atomic Energy Commission, 1951.
208 pp., 47 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 6222. Microfilm copy, \$2.75; paper binding, \$7.30; library binding, \$9.55; plus shipping and handling charges. Also available from the Federal Clearinghouse as Report TID-5226. Microfilm, \$9.30; photostat, \$31.80.

A discussion of the use of heavy water in reactors, the properties and reactions of heavy water and uranium oxide mixtures, and the stability of construction materials.

CONTENTS: Introduction and theory. Properties of the uranium oxides. Physical properties of slurries. Reactions of the uranium oxides. Stability of construction materials. Author and subject indexes.

RAW MATERIALS

■ CONTRIBUTIONS TO THE GEOLOGY OF URANIUM AND THORIUM BY THE UNITED STATES GEOLOGICAL SURVEY AND ATOMIC ENERGY COMMISSION

Compiled by L. R. Page, H. E. Stocking, and Harriet B. Smith.

U. S. Geological Survey and U. S. Atomic Energy Commission, 1956.

739 pp., 230 illus. (plus 3 folded maps), $9\frac{1}{4} \times 11\frac{3}{8}$. Available from GPO as *Geological Survey Professional Paper* 300, \$6.00.

A presentation of comprehensive scientific results of the U. S. Government's intensive investigations of the geology of fissionable materials.

CONTENTS: Introduction. Natural occurrence of uranium and age of uranium deposits. Natural occurrence of thorium. Analytical chemistry of uranium and thorium. Methods of prospecting. Subject and author indexes.

■ PROSPECTING FOR URANIUM

U. S. Atomic Energy Commission and
U. S. Geological Survey, 1957.
228 pp., 11 illus., $4\frac{1}{2} \times 5\frac{3}{4}$. Available
from GPO, \$0.75.

A presentation, in brief form, of information on all phases of the occurrence, identification, and sale of uranium-bearing ores. It describes the special techniques used in prospecting for radioactive material, but does not cover methods or equipment used in ordinary prospecting.

CONTENTS: Uranium-bearing minerals. Where to look for uranium. Testing for uranium. Prospecting with radiation-detection instruments. Evaluation of discoveries. Sale of uranium. Laws and regulations. Questions frequently asked. Glossary. Appendixes: sources of additional information; manufacturers of radiation detection instruments suitable for prospecting; domestic price schedules; licensing and leasing regulations; Bureau of Land Management circulars; laws.

■ URANIUM ORE PROCESSING
(1958 Geneva Conference)

Edited by J. W. Clegg and D. D. Foley,
Battelle Memorial Institute.
Addison-Wesley, 1958.
436 pp., 109 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available
from University Microfilms as OP No.
17586. Microfilm, \$5.20; paper binding,
\$15.55; library binding, \$17.80;
plus shipping and handling charges.

A condensed but essentially complete description of practices used in extracting uranium from its ores. Although the emphasis is on a well-rounded presentation of current practices in the United States, techniques in other countries are also described. Because of its comprehensive and authoritative nature, the volume should be a valuable reference for all workers in the field. Various processes are described in full, and there are many helpful comments and observations. Each chapter is accompanied by an extensive reference list.

CONTENTS: Uranium occurrence and sources. Uranium exploration and mining. Sampling and analysis. Mineralogy of uranium as it relates to hydrometallurgical processing. Preliminary ore treatment. Acid leaching of uranium ores. Carbonate leaching of uranium ores. Liquid-solids separations. Uranium recovery by ion exchange. Uranium recovery by solvent extraction. Examples of uranium milling operations. Uranium recovery from phosphate rock, monazite, lignite, and shale. Health and safety problems associated with uranium mining and milling. Appendix: main uranium districts in the United States.

REACTORS

■ BOILING WATER REACTORS
(1958 Geneva Conference)

By Andrew W. Kramer, editor of *Atomics*.
Addison-Wesley, 1958.

563 pp., 308 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available
from University Microfilms as OP No.
17582. Microfilm, \$6.75; paper binding,
\$20.20; library binding, \$22.45;
plus shipping and handling charges.

A reference work on the history and technology of boiling-water reactors which was prepared under the auspices of the Argonne National Laboratory with the cooperation of the many scientists and engineers there who conceived and developed this type reactor. It presents a brief history of the boiling-water concept and of the early experiments of the Argonne Laboratory, including the development and operation of the Experimental Boiling Water Reactor. The various BORAX experiments are described in detail. A thorough explanation is given of the physics underlying the design of the reactor, and a lengthy description of the General Electric Company Vallecitos plant is included. The book concludes with a discussion of present and future research and development programs for boiling reactors.

■ CORROSION AND WEAR HANDBOOK
FOR WATER-COOLED REACTORS

Edited by D. J. DePaul, Bettis Plant,
Westinghouse Electric Corp. (Sponsored
by Naval Reactors Branch, Division of
Reactor Development, USAEC.)
U. S. Atomic Energy Commission, 1957.
293 pp., 152 illus., $7\frac{7}{8} \times 10\frac{1}{4}$. Available
from GPO as Report TID-7006, \$2.25.

A handbook of theory and experimental data on corrosion and wear of materials in water-cooled nuclear reactors. The book presents in one reference book corrosion and wear data resulting from the development of the *Nautilus* submarine reactor and the Shippingport Pressurized Water Reactor projects.

CONTENTS: Fundamental aspects of iron corrosion. Fundamental aspects of friction and wear. Water technology. Description of testing procedures. Approach to corrosion problems. Tabulation of basic data. Relative importance of different variables. Crevice corrosion. Stress corrosion. Intergranular corrosion. Corrosion products in recirculating systems. Application considerations of wear. Manufacturing procedures affecting corrosion and wear. Glossary of terms. Index.

■ THE ELEMENTS OF NUCLEAR REACTOR THEORY

By Samuel Glasstone, consultant to the USAEC, and Milton C. Edlund, Oak Ridge National Laboratory.

D. Van Nostrand Co., 1952.

416 pp., 85 illus., $6 \times 9\frac{1}{4}$, \$5.50.

An introduction to the subject of nuclear-reactor theory.

This book has been translated into Czechoslovakian, German, and Polish.

CONTENTS: Nuclear structure and stability. Nuclear reactions. Production and reactions of neutrons. Fission process. Diffusion of neutrons. Slowing down of neutrons. Bare homogeneous thermal reactor (sources determined by Fermi age theory). Homogeneous reactor with reflector: the group-diffusion method. Heterogeneous (natural uranium) reactors. Time behavior of a bare thermal reactor. Reactor control. General theory of homogeneous multiplying systems. Perturbation theory. Transport theory and neutron diffusion. Index.

■ THE EXPERIMENTAL BOILING WATER REACTOR (EBWR)

By Argonne National Laboratory.

U. S. Atomic Energy Commission, 1957.

233 pp., 179 illus., $7\frac{7}{8} \times 10\frac{1}{4}$. Available from GPO as Report ANL-5607, \$2.25.

A detailed technical description of the experimental atomic power plant at Argonne National Laboratory written by the scientists and engineers who designed and built the plant and placed it in operation.

CONTENTS: Design summary. Operational characteristics. Component description. Appendixes: method of calculating the heterogeneous reactor; boiling density studies; properties of fuel materials; production of fuel subassemblies; coolant activation and decomposition; pressure-vessel and thermal-shield design philosophy; explosion containment; shielding calculations; initial plant startup; future variations in mode of operation; pressure strength and leakage-rate test of power plant steel shell; design of vessel support structure.

■ FLUID FUEL REACTORS (1958 Geneva Conference)

Edited by J. A. Lane and H. G. MacPherson, Oak Ridge National Laboratory, and Frank Maslan, Brookhaven National Laboratory.

Addison-Wesley, 1958.

979 pp., 338 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available from University Microfilms as OP No. 17578. Microfilm, \$11.80; paper binding, \$35.30; library binding, \$37.55; plus shipping and handling charges.

A comprehensive discussion of three basic types of fluid-fuel reactors. This book summarizes results of research carried on in the United States for almost 10 years. A unique feature of this work is its approach to the subject from the chemical standpoint rather than from the mechanical-engineering standpoint.

CONTENTS: Aqueous homogeneous reactors. Molten-salt reactors. Liquid-metal-fuel reactors.

■ FUNDAMENTAL ASPECTS OF REACTOR SHIELDING

By Herbert Goldstein, Nuclear Development Corporation of America.

Addison-Wesley, 1959.

416 pp., 95 illus., $6\frac{1}{8} \times 9\frac{1}{4}$, \$9.75.

An exposition of the fundamental processes involved in shielding against neutron and gamma radiation. This book is a revision of the AEC-sponsored book *The Attenuation of Gamma Rays and Neutrons in Reactor Shields*, which is now out of print.

CONTENTS: Introduction. Background information. Sources of neutrons and gamma rays. Experimental bulk-shielding facilities for the study of neutron and gamma-ray attenuation. Attenuation of gamma rays. Calculations of fast neutron penetration. Appendixes: the gamma-ray spectrum from fission products; radiative capture gamma-ray spectra; the exponential on E_n functions; gamma-ray buildup factors; moments-method results for neutron penetration in various materials. Index.

■ MATERIALS TESTING REACTOR PROJECT HANDBOOK

Edited by J. H. Buck, Oak Ridge National Laboratory, and C. F. Leyse, Argonne National Laboratory.

U. S. Atomic Energy Commission, 1951.

572 pp., 239 illus., $10\frac{3}{4} \times 8\frac{1}{2}$. Available from the Federal Clearinghouse as Report TID-7001. Microfilm, \$11.10; photostat, \$88.80.

A semidetalled description of the reactor and a discussion of the reasons for the design.

CONTENTS: General description and history of the MTR. Engineering description of the reactor. Experimental facilities. Physics of the materials testing reactor. Control system. Canal and canal handling facilities. Process-water system. Reactor cooling-air and contaminated-air systems. Site and

buildings. Supporting facilities and auxiliaries. Appendixes: criticality studies on enriched uranium-heavy water systems; work on critical experiments, July 1946 to December 1948; critical experiments on simulated MTR structure; mockups; beryllium; fuel elements; properties of shielding materials; shielding-calculation aids; pneumatic rabbits; hydraulic rabbits.

■ NEUTRON AND GAMMA IRRADIATION FACILITIES

Compiled by F. G. Minuth and John H. Martens, Argonne National Laboratory. U. S. Atomic Energy Commission, 1957. 79 pp., 19 illus., $7\frac{1}{8} \times 10\frac{1}{4}$. Available from GPO, \$0.60.

A book that describes and catalogs the irradiation facilities available at research reactors, spent-fuel installations, and Co^{60} sources. It explains services that each facility provides and tells how to obtain them. Representative cases are cited to illustrate costs of irradiation services.

CONTENTS: Part I: Reactor irradiation facilities. Part II: Gamma irradiation facilities.

■ NOISE ANALYSIS IN NUCLEAR SYSTEMS (No. 4 of AEC Symposium Series)

Coordinator, Robert E. Uhrig, University of Florida. U. S. Atomic Energy Commission, 1964. 505 pp., 242 illus., 6×9 . Available from the Federal Clearinghouse as Report TID-7679, \$3.75.

Proceedings of a symposium held at the University of Florida, Nov. 4-6, 1963, sponsored by the University of Florida and by the USAEC.

CONTENTS: 28 papers on noise analysis in nuclear systems.

■ NUCLEAR REACTOR CONTROL ENGINEERING

By J. M. Harrer, Argonne National Laboratory. D. Van Nostrand Co., 1963. 587 pp., 271 illus., $6\frac{1}{8} \times 9\frac{1}{4}$, \$16.50.

A compilation and analysis of existing information on the theory and design of nuclear reactor control systems. Comprehensive presentation of nuclear reactor control engineering enables the reader to have much more than a fundamental knowledge of this field.

CONTENTS: The reactor control loop. Elementary reactor characteristics. Reactor control engineering. Control-rod design considerations. Neutron

detectors. Control-rod drive mechanisms. Feedback control systems. Reactor-system transfer functions. Reactor regulating rod servos. Nuclear reactor control below 1% rated power. Control in the power range. Reactor safety. Control applications and special devices. Computer and simulator applications. Bibliography. Index.

■ NUCLEAR REACTOR ENGINEERING

By Samuel Glasstone, consultant to the USAEC, and Alexander Sesonske, Purdue University. D. Van Nostrand Co., 1963. 830 pp., 194 illus., $6\frac{1}{8} \times 9\frac{1}{4}$, \$9.20.

An updated and reorganized revision of Samuel Glasstone's *Principles of Nuclear Reactor Engineering*. A basic and widely used introductory text to nuclear engineering.

Principles of Nuclear Reactor Engineering has been translated into Japanese, Polish, Italian, and Yugoslavian.

CONTENTS: Introduction to nuclear reactor engineering. Nuclear reactions and radiations. Diffusion and slowing down of neutrons. Reactor theory: the steady state. Control of nuclear reactors. Energy removal. Reactor structural and moderator materials. Reactor fuels. Radiation protection and reactor safeguards. Shielding of nuclear reactor systems. Mechanical and structural components. Preliminary reactor design. Nuclear reactor systems. Nuclear power costs. Appendix: tables. Index.

■ NUCLEAR REACTOR EXPERIMENTS

Edited by J. B. Hoag, Argonne National Laboratory. D. Van Nostrand Co., 1958. 480 pp., 234 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$6.75.

A laboratory manual detailing 49 experiments involving the theory and practice of fission-reactor measurements.

CONTENTS: Some basic information. Nuclear radiation detection. Moderator assemblies. Subcritical assemblies. Cross sections. Experiments using an operating reactor. Some characteristics of operating reactors. Heat removal from a reactor. Fuel preparation for a heterogeneous reactor. Corrosion and radiation effects. A metallurgy "hot" laboratory. Separations processes. Appendixes: some abbreviations for the literature; conversion of energy units; decay and exposure factors for indium and gold; physical and thermodynamic properties of light and heavy water, transport properties of sodium-potassium alloy (NaK); thermocouple calibration data. Index.

■ POWER REACTORS

By Division of Reactor Development, USAEC.

U. S. Atomic Energy Commission, 1958.
92 pp., 75 illus., $7\frac{1}{8} \times 10\frac{3}{8}$. Available
from GPO, \$0.65.

A compact summary of technical information
on 10 full-scale nuclear power plants built,
under construction, or being undertaken in the
United States. The text is well illustrated and
reinforced with lengthy tabulations of data.

CONTENTS: Pressurized-water reactors: Con-
solidated Edison Thorium Reactor, Yankee Atomic
Electric Power Plant, and Army Package Power
Reactor. Boiling-water reactors: Vallecitos Boil-
ing Water Reactor, Dresden Nuclear Power Station,
and Northern States Nuclear Power Plant. Sodium-
graphite reactor: Hallam Nuclear Power Facility.
Organic-moderated reactor: Organic Moderated
Reactor Power Plant. Fast breeder reactor: Enrico
Fermi Atomic Power Plant. Sodium-heavy-water
reactor: Chugach Nuclear Power Plant.

■ REACTOR HANDBOOK (1st edition) (In 3 volumes)

Editorial coordinators, John F. Hogerton
and R. C. Grass, Vitro Corporation of
America.

U. S. Atomic Energy Commission, 1955.

□ Volume I: *Physics* (Report AECD-3645),
790 pp., 186 illus., $7\frac{1}{8} \times 10\frac{1}{4}$. Paper
binding, \$4.25.

□ Volume II: *Engineering* (Report AECD-
3646), 1088 pp., 447 illus., $7\frac{1}{8} \times 10\frac{1}{4}$.
Paper binding, \$5.50.

□ Volume III: *General Properties of Ma-
terials* (Report AECD-3647), 614 pp.,
243 illus., $7\frac{1}{8} \times 10\frac{1}{4}$. Paper binding,
\$3.50.

Available from GPO.

A handbook consisting of three volumes.

CONTENTS: Volume I: Reactor Physics. Reactor
physics. Radiation shielding. Appendixes: tables.
Index. Volume II: Engineering. Light- and heavy-
water-cooled-systems. Liquid-metal-cooled sys-
tems. Gas-cooled systems. Aqueous fuel systems.
Liquid-metal-fuel systems. Fused-salt systems.
Handling and control. Reactor designs. Appendix:
tables. Index. Volume III: General Properties of
Materials. General properties of fuel, moderator,
reflector, control, shielding, and structural mate-
rials. Appendix: tables. Index.

■ REACTOR HANDBOOK (2nd edition) (In 4 volumes)

Interscience Publishers.

All volumes are $7\frac{1}{2} \times 10$.

□ Volume I: *Materials*, edited by C. R.
Tipton, Jr., Battelle Memorial Insti-
tute, 1960. 1207 pp., 1090 illus., \$36.50.

□ Volume II: *Fuel Reprocessing*, edited by
S. M. Stoller, consultant, formerly of
Vitro Corporation of America, and R. B.
Richards, General Electric Company,
1961. 665 pp., 645 illus., \$21.40.

□ Volume III, Part A: *Physics*, edited by
H. Soodak, Nuclear Development Cor-
poration of America, 1962. 313 pp.,
231 illus., \$10.75.

□ Volume III, Part B: *Shielding*, edited by
E. P. Blizard and Lorraine S. Abbott,
Oak Ridge National Laboratory, 1962.
287 pp., 321 illus., \$9.00.

□ Volume IV: *Engineering*, edited by Stuart
McLain, consultant to Argonne National
Laboratory, and John H. Martens, Ar-
gonne National Laboratory, 1964. 857
pp., 444 illus., \$25.40.

A handbook that provides authoritative ac-
counts of nuclear theory, data, hardware, and
processes developed in atomic-energy pro-
grams. The *Reactor Handbook* represents the
efforts of several hundred authors and con-
tributors and is a desk reference for technical
people engaged in research, development, and
design. More than five years of effort have
gone into the preparation of this edition. The
process of gathering, evaluating, digesting,
and organizing the vast quantity of nuclear in-
formation and data included in the four vol-
umes was under the guidance of an Editorial
Review Board composed of W. H. Zinn, Chair-
man, General Nuclear Engineering Corp.; H.
Brooks, Harvard University; P. F. Gast, Han-
ford Atomic Products Operation, General Elec-
tric Company; J. P. Howe, Atomics Interna-
tional, North American Aviation, Inc.; Stephen
Lawroski, Argonne National Laboratory; and
M. C. Leverett, Aircraft Nuclear Propulsion
Department, General Electric Company.

CONTENTS: Volume I: Materials. Part A: General.
Health, safety, and accountability considerations for
source and special nuclear materials. Generalities
of radiation damage. D_2O-H_2O separation. Zircor-
nium-hafnium separation. Radiation damage to
miscellaneous materials. Part B: Fuel Materials.
The status of solid-fuel-materials development.
Uranium. Uranium alloys. Thorium. Thorium al-
loys. Plutonium and its alloys. Ceramics. Disper-
sion fuels. Fabrication of fuel elements. Composi-
tion and properties of liquid-metal fuel and fertile
systems. Aqueous fuel systems. Molten salts as
reactor fuels. Part C: Cladding and Structural Ma-
terials. The selection of cladding and structural
materials. Aluminum and its alloys. Carbides and
cermets. Cobalt-base alloys. Chromium and its al-
loys. Stainless steels. Magnesium and its alloys.
Molybdenum and its alloys. Niobium and its alloys.
Nickel and its alloys. Tantalum. Tungsten. Tita-
nium and its alloys. Vanadium and its alloys. Zir-
conium and its alloys. Special-purpose alloys. Ma-
terials for valves and bearings in molten metals

and fused salts. Part D: Control Materials. The engineering requirements for control and burnable-poison materials. Hafnium. Boron. Cadmium. Rare earths. Silver. Part E: Moderator Materials. Review of moderator materials. Light and heavy water. Graphite. Beryllium metal, alloys, and compounds. Organic materials. Hydrides and hydroxides. Part F: Coolant Materials. Introduction to coolant materials. Gas coolants. Liquid metals. Part G: Shielding Materials. Relation of materials to shielding. The nuclear, physical, and mechanical properties of shielding materials. Radiation damage. Bulk-shielding data. Appendix: constitutional diagrams of binary alloy systems. Index.

Volume II: Fuel Reprocessing. Part A: Introduction. Reactor system effects. Reprocessing and reconversion economics. Part B: Aqueous Separations Processes. Head-end processes for solid fuels. Aqueous separation. Reprocessing of aqueous fuel. Fluoride and other halide volatility processes. Part C: Non-aqueous Separations Processes: pyrometallurgical processes. Part D: Reconversions. Natural, slightly enriched, or depleted uranium chemistry. Highly enriched or fully enriched uranium chemistry. Thorium chemical reconversion. Plutonium reconversions. Isotopic enrichment. Part E: Radioactive Waste Disposal. Gaseous waste. Liquid-waste treatment and disposal. Solid wastes. Part F: Engineering. Plant design. Equipment design: process and mechanical considerations. Plant management. Index.

Volume III, Part A: Physics. Nuclear data. Experimental methods. Theory of neutron transport. Reactor statics, theoretical. Reactor dynamics. Critical data. Index.

Volume III, Part B: Shielding. Shield design criteria and procedures. Sources of neutrons and gamma rays. Neutron attenuation. Gamma-ray attenuation. Analytical methods of shield design. Ducts and voids in shields. Heat generation in shields. Shield optimization with respect to weight. Air, ground, and structure scattering. Index.

Volume IV: Engineering. Fluid flow. Heat transfer. External loop components. Heat generation and thermal analysis. Fuel-element design. Structural analysis. Maintenance of coolants. Control and instrumentation. Shielding. Reactor operations. Reactor safety. Reactor site and plant layout. Plant operations and services. Remote handling of radioactive materials. Reactor development test facilities. Heterogeneous water-cooled reactors. Liquid-metal-cooled reactors. Gas-cooled reactors. Aqueous fuel reactors. Liquid-metal-fuel reactors. Molten-salt reactors. Index.

■ REACTOR KINETICS AND CONTROL (No. 2 of AEC Symposium Series)

Coordinator, Lynn E. Weaver, University of Arizona.

U. S. Atomic Energy Commission, 1964.
588 pp., 300 illus., 6 × 9. Available from the Federal Clearinghouse as Report TID-7662, \$4.25.

Proceedings of a symposium held at the University of Arizona, Mar. 25-27, 1963, sponsored by the University of Arizona in co-

operation with Argonne National Laboratory and Associated Midwest Universities.

CONTENTS: 29 papers on reactor kinetics and control.

■ REACTOR MATERIALS SPECIFICATIONS

Compiled and edited by R. M. Evans, Oak Ridge National Laboratory.

U. S. Atomic Energy Commission, 1958.
246 pp., 31 illus., 8 × 10^{1/2}. Available from the Federal Clearinghouse as Report TID-7017, \$4.00.

A presentation of material specifications for tubes, plates, rods, etc., of Inconel, Hastelloy B, and austenitic stainless steel. Procedures for welding these materials to various alloys in different thicknesses are given, as well as inspection requirements.

CONTENTS: Reactor-material specifications. Reactor-material welding specifications. Reactor-material inspection specifications. Reactor-material special specifications.

■ REACTOR NOISE (AEC-ANS Monograph)

By Joseph A. Thie, Consultant, USAEC.
Rowman and Littlefield, 1963.

262 pp., 119 illus., 6 × 9. Paper binding, \$4.45; library binding, \$6.95.

A discussion of the use of reactor noise as a means of obtaining information on reactors.

CONTENTS: Introduction. Statistical properties of noise. Theory of power spectra. Cross-correlation. Autocorrelation. Time analyses of zero-power reactors. Frequency analysis of zero-power reactors. Data recording. Digital analysis. Electronic analyzers and analog computers. Noise analysis of power reactors. Appendixes: EBWR data; reactor characteristics; glossary. Index.

■ REACTOR SHIELDING DESIGN MANUAL

Edited by Theodore Rockwell III, Naval Reactors Branch, Division of Reactor Development, USAEC. (Sponsored by Naval Reactors Branch, Division of Reactor Development, USAEC.)

D. Van Nostrand Co., 1956.

472 pp., 271 illus., 8^{1/8} × 10^{5/8}, \$10.00.

A description of procedures and data used in designing, constructing, and testing the shielding for naval and Shippingport pressurized-water reactors. This book is a reprint of USAEC Report TID-7004, same title.

CONTENTS: Introduction and outline of basic shielding theory. Setting allowable radiation levels. Shielding the reactor core. Shielding the reactor cooling system. Plant layout and other factors affecting total shield design. Shield engineering.

Radioactivity of shutdown system (the accessibility problem). Effect of irregularities in shield. Effect of geometry of radiation source. Basic data. Chart of the nuclides.

■ REACTOR TECHNOLOGY (Selected Reviews—1964)

Edited by Leonard E. Link, Argonne National Laboratory.

U. S. Atomic Energy Commission, 1964.

624 pp., 213 illus., 6 × 9. Available from the Federal Clearinghouse as Report TID-8540, \$6.50.

Presents some highlights of a year's progress in reactor technology. Broadly reviews aspects of the field and brings the reader up to date. The audience includes all active participants in the reactor program from scientists working in the more basic aspects of the applied field to project managers whose duties generally become more administrative than technical.

CONTENTS: Commercial power reactors cooled with gas or light water. Commercial power reactors cooled with sodium, heavy water, or organic liquids. Boiling "burnout" for reactor design. In-core instrumentation. Behavior of cladding materials in water and steam environments. Metallic fuels. Pyroprocessing of reactor fuels. Reactor by-products. Reactor-physics data for water-moderated lattices of slightly enriched uranium. Index.

■ RESEARCH REACTORS (1955 Geneva Conference)

Compiled by North American Aviation, Inc., Oak Ridge National Laboratory, National Reactor Testing Station, Knolls Atomic Power Laboratory, Argonne National Laboratory, and Brookhaven National Laboratory.

U. S. Atomic Energy Commission, 1955.
443 pp., 393 illus., 8 1/4 × 10 1/2. Available from McGraw-Hill, \$6.50. Also available from GPO. Paper binding, \$2.00.

A presentation of detailed descriptions of representative designs of nuclear research reactors.

CONTENTS: Introduction. Light-water-moderated reactors (three types). Light-water- and oil-moderated reactors. Heavy-water-moderated reactor. Graphite-moderated reactor.

■ THE SHIPPINGPORT PRESSURIZED WATER REACTOR (1958 Geneva Conference)

By Naval Reactors Branch, Division of Reactor Development, USAEC; Bettis Plant, Westinghouse Electric Corp., and Duquesne Light Company. (Spon-

sored by Naval Reactors Branch, Division of Reactor Development, USAEC.)
Addison-Wesley, 1958.

588 pp., 167 illus., 6 1/4 × 9 1/4. Available from University Microfilms as OP No. 17585. Microfilm, \$7.05; paper binding, \$21.05; library binding, \$23.30; plus shipping and handling charges.

An account of the research and development for and construction of the first large-scale central-station nuclear power plant to be built and operated in the United States. This publication is the basic sourcebook for the plant and its technology. For those who want more detailed information, selected references are given at the end of each chapter.

CONTENTS: Design philosophy. Reactor coolant system. Physics. Reactor. Fuel-element development. Core manufacturing. Chemistry. Reactor-plant auxiliary systems. Control and instrumentation systems. Radioactive-waste-disposal system. Hazards evaluation. Electrical and mechanical components. Shielding. Turbine-generator plant. Site description and development. Architectural design of the nuclear plant. Construction. Test program. Procurement. Preparation for the operation of Shippingport Atomic Power Station. Bibliography. Appendix: Shippingport plant and reactor characteristics.

■ SODIUM GRAPHITE REACTORS (1958 Geneva Conference)

By Chauncey Starr and Robert W. Dickinson, Atomics International, Division of North American Aviation, Inc.
Addison-Wesley, 1958.

288 pp., 99 illus., 6 1/4 × 9 1/4. Available from University Microfilms as OP No. 17583. Microfilm, \$3.55; paper binding, \$10.55; library binding, \$12.80; plus shipping and handling charges.

A unified and coherent presentation of sodium graphite reactor technology. Emphasis has been placed on the design and development of the Sodium Reactor Experiment (SRE); however, information applicable to sodium-graphite systems and, in many cases, to reactor design in general is included. The Hallam Nuclear Power Facility, a full-scale sodium-graphite plant on which construction has started, is described.

CONTENTS: Sodium-graphite reactors and their importance to the nuclear industry. Sodium-reactor experiment. Nuclear and design characteristics. Materials requirements. Fuel-element development. SRE components and systems. Installation and operation of SRE. Large-scale sodium-graphite concepts. Index.

■ **SOLID FUEL REACTORS (1958 Geneva Conference)**

By Joseph R. Dietrich and Walter H. Zinn,
General Nuclear Engineering Corp.
Addison-Wesley, 1958.

844 pp., 377 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available
from University Microfilms as OP No.
17587. Microfilm, \$10.05; paper bind-
ing, \$30.10; library binding, \$32.35;
plus shipping and handling charges.

A review of the basic concepts, present status
of development in the United States, and tech-
nical and economic outlooks in this country for
five projected solid-fuel nuclear power reac-
tor types.

CONTENTS: The fast-neutron power reactor. The
experimental breeder reactor. The Enrico Fermi
Atomic Power Plant. Heavy-water power reactors.
Gas-cooled reactors. Organic-cooled and -mod-
erated reactors. Plutonium recycling in thermal
reactors. Index.

■ **SYSTEM ANALYSIS OF NUCLEAR REACTOR
DYNAMICS (AEC-ANS Monograph)**

By Lynn E. Weaver, University of
Arizona.

Rowman and Littlefield, 1963.

285 pp., 174 illus., $6\frac{1}{8} \times 9\frac{1}{4}$. Paper bind-
ing, \$4.45; library binding, \$6.95.

A discussion of the various concepts in linear
system analysis and their use in analyzing the
stability and dynamic behavior of fundamental
reactor systems.

CONTENTS: Complex plane transformations. Sys-
tem components. Reactor kinetics equations. Feed-
back analysis. Nuclear systems analysis. Analog
simulation. System design. Statistical control
theory. Appendixes: elementary Laplace-transform
pairs; properties of Laplace transforms; residues;
computer diagrams for simulation of transfer func-
tions; second-order systems; input and feedback
networks for operational amplifiers; some nonlinear
circuits and their transfer characteristics; tabu-
lated values of the integral form. Bibliography.
Index.

■ **THE TECHNOLOGY OF NUCLEAR REACTOR
SAFETY**

(In 2 volumes)

Edited by T. J. Thompson and J. G. Beck-
erley, Massachusetts Institute of Tech-
nology.

Massachusetts Institute of Technology
Press, 1965.

□ Volume I: *Reactor Physics and Control*,
743 pp., 554 illus., \$25.00.

□ Volume II: *Reactor Materials and Engi-
neering*.

A unified compilation of knowledge gained to
date about nuclear reactor safety from about
seventy-five reactor years of operating ex-
perience. The first volume presupposes a
knowledge of nuclear reactor theory, whereas
the second volume requires some knowledge
of engineering.

CONTENTS: Volume I: Reactor Physics and Con-
trol. The reactor core. General reactor kinetics.
The Doppler effect. Criticality. Sensing and control
instrumentation. Dynamics of fast transients. Water
reactor kinetics. Kinetics of solid moderator reac-
tors. Fast reactor kinetics. Accidents. Appendixes.
Subject index. Volume II: Reactor Materials and
Engineering. Materials and metallurgy. Fuel ele-
ments. Mechanical design of components for reactor
systems. Fluid flow. Heat transfer. Chemical re-
actions. Fission-product release. Fission-product
leakage. Radioactive waste management. The con-
cepts of reactor containment. Containment and con-
finement structures. Appendixes. Subject index.

■ **U. S. RESEARCH REACTOR OPERATION
AND USE (1958 Geneva Conference)**

Edited by Joel W. Chastain, Jr., Battelle
Memorial Institute.

Addison-Wesley, 1958.

366 pp., 173 illus., $6\frac{1}{4} \times 9\frac{1}{4}$. Available
from University Microfilms as OP No.
17580. Microfilm, \$4.45; paper bind-
ing, \$13.30; library binding, \$15.55;
plus shipping and handling charges.

A presentation of information not only about
technical aspects, characteristics, and opera-
ting problems but also on administrative,
legal, and cost problems. Written primarily
for scientists, engineers, and administrators
owning or using a reactor, this volume also
may serve as a text or reference for intro-
ductory courses in reactor engineering.

CONTENTS: The research reactor. Research reac-
tor physics. Light-water-moderated heterogeneous
reactors. Heavy-water reactors. Homogeneous re-
actors. Graphite reactors. Reactors for transient
studies and special reactors. Research-reactor
supporting facilities. Safety considerations. Ex-
perimental research with reactors. Preroutine re-
actor operations. Operation and maintenance of
research reactors. Cost of reactor facilities. Regu-
lations and insurance. Appendix: reactors for
foreign locations. Index.

■ **U. S. RESEARCH REACTORS**

Edited by Joel W. Chastain, Jr., Battelle
Memorial Institute.

U. S. Atomic Energy Commission, 1957.

73 pp., 116 illus., $8\frac{1}{2} \times 11$. Available
from the Federal Clearinghouse as
Report TID-7013, \$1.50.

A profusely illustrated booklet that gives the chief features and characteristics of more than 30 research reactors in the United States. Cost information is furnished for most of the reactors.

CONTENTS: Light-water-moderated reactors: pool reactors; tank reactors. Heavy-water-moderated reactors. Graphite-moderated reactors. Homogeneous reactors. Reactors for safety research. Glossary of reactor terms. Listing of U. S. research reactors.

VACUUM TECHNOLOGY

■ VACUUM EQUIPMENT AND TECHNIQUES (NNES)

Edited by A. Guthrie and R. K. Wakerling,
Radiation Laboratory, University of
California.

McGraw-Hill, 1949.

264 pp., 105 illus., $6\frac{1}{2} \times 9\frac{1}{2}$, \$3.75.

A review of studies and developments of high-vacuum equipment and techniques by the University of California.

CONTENTS: Fundamental considerations. Elements of the vacuum system. Vacuum gauges. Materials and equipment. Leak-detection instruments and techniques. Appendixes: list of symbols; summary of formulas useful in vacuum design; some convenient constants and conversion factors; tables;

mechanical-pump and diffusion-pump oils; miscellaneous vacuum materials; properties of some solids and liquids used in vacuum practice. Index.

■ VACUUM PROBLEMS AND TECHNIQUES (NNES)

By C. E. Normand, Frank A. Knox, G. W. Monk, Alan J. Samuel, and W. R. Perret,
Clinton Engineer Works, Tennessee
Eastman Corporation.

U. S. Atomic Energy Commission, 1950.

265 pp., 78 illus., 6×9 . Available from
the Federal Clearinghouse as Report
TID-5210. Microfilm, \$8.27; Xerox,
\$17.00.

A discussion of routine production of high vacuum in large systems on a scale never previously undertaken. Such high vacuum was required in the operation of the electromagnetic-separation processes for uranium isotopes at the Clinton Engineer Works. This book describes the original vacuum equipment, evaluates its performance in view of the extensive experience gained, and presents the most significant improvements in efficiency that resulted from changes in operating techniques.

CONTENTS: Production-plant vacuum systems. Materials used in vacuum systems. Cold traps and refrigerants. Vacuum-system instrumentation. Vacuum testing and leak detection. Appendixes: vacuum formulas; suppliers of vacuum equipment and materials; bibliography. Index.

PART 2

Technical Books in Preparation

GENERAL REFERENCE

■ HANDBOOK ON AIR CLEANING

By Leslie Silverman *et al.*, Harvard Air Cleaning Laboratory.

Estimated date of publication by GPO: spring of 1966.

An updated revision of the 1952 publication. It will present current information on air-cleaning methods for particulate removal and criteria for judging their effectiveness.

CONTENTS: Behavior of aerosols in air cleaning. Performance and evaluation of air-cleaning equipment. Special problems involved in the cleaning of radioactive aerosols.

■ METEOROLOGY AND ATOMIC ENERGY (2nd edition)

Edited by David H. Slade, Environmental Meteorological Research Project, U. S. Weather Bureau, Washington, D. C.

Estimated date of publication: spring of 1966.

A reference work being prepared by the Weather Bureau, U. S. Department of Commerce, at the request of the Division of Reactor Development, AEC. This edition will update information published in the 1955 edition and put more stress on the theory and experiments that have led to current diffusion forecasting techniques.

CONTENTS: Fundamentals for atmospheric diffusion and pollution studies. Theory of atmospheric turbulent diffusion. Experimental determination of diffusion processes. Radioactive dosage calculations. Intermediate and long-range diffusion and pollution problems. Application of meteorology to nuclear-energy problems. Environmental safety analyses. Meteorological instruments and equipment. Index.

BIOLOGY AND MEDICINE

■ THE BEAGLE AS AN EXPERIMENTAL ANIMAL

Edited by A. C. Andersen, University of California.

Estimated date of publication: summer of 1966.

A compendium of basic knowledge on the animal.

CONTENTS: Husbandry. Anatomy. Physiology. Nutrition. Radiology. Behavior. Gerontology. Pathology. Specific techniques. Catalog of data-standard beagle.

■ THE BIOLOGY OF THE PARASITIC WASP, *MORMONIELLA VITRIPENNIS* (WALKER)

By Anna R. Whiting, Consultant, Biology Division, Oak Ridge National Laboratory.

Estimated date of publication: fall of 1965.

A review of the insect by the scientist who introduced it into biological research.

CONTENTS: Biology. Behavior. Economic importance and host life. Physiology. Ecology. Techniques. Cytology. Genetics. Advantages and disadvantages for experimental purposes. Bibliography.

■ ENVIRONMENT OF CAPE THOMPSON REGION, ALASKA

Edited by Norman J. Wilimovsky, University of British Columbia.

Estimated date of publication by USAEC: summer of 1965.

A composite study of various environmental parameters in a little known region of Arctic Alaska. This is a scientific report of many investigators on the physical environment and the biota and some of their interrelations, based on simultaneous investigations carried out from 1959 through 1962. It is the most comprehensive study of a single area of this size ever made in the Arctic.

CONTENTS: A chapter on previous explorations and a chapter on weather and climate preface the major divisions of the book. 20 chapters on the land, its physical aspects, biotic systems, and bio-environment. 3 chapters are devoted to the physical phenomena and biotic patterns of the coast. 18 chapters cover the physical, bioenvironments, people, and radioactivity of the Chukchi Sea.

■ LATE SOMATIC EFFECTS OF IONIZING RADIATION

By Charles D. Van Cleave, University of North Carolina.

Estimated date of publication: winter of 1966-1967.

A close look at the nature of late somatic effects.

CONTENTS: Introduction. Life shortening. Carcinogenesis. Leukemogenesis. Nonneoplastic effects. Prenatal radiation and late life vigor. Pathology and performance in tissues. Late effects in cells. Late effects at subcellular levels. Modification of late effects. Similarities and differences of late radiation effects and senescence. The nature of ir-

reparable injury. Organization and degenerative changes. Summary.

■ RADIATION BIOLOGY

By Alison P. Casarett, University of Rochester, Rochester, N. Y.

Estimated date of publication: fall of 1966.

A book that will serve as an introductory text in the area of radiation biology. It presents the material beginning with the effects of radiation on the smallest unit, the biochemical molecule, and progresses through the effects on the cells, tissues, organs, organisms, species, and ecosystems. A brief discussion on applied effects is then presented.

CONTENTS: Introduction. Radiation physics. Radiation detection and measurement. Radiation chemistry and biochemistry. Radiation and the cell. Radiation genetics. Radiation effects on independent cell systems. Radiation effects on major organ systems. Acute radiation effects on whole animals. Modification of radiation injury and protection against it. Long-term radiation effects. Effects of radiation on plants. Effects of ultraviolet radiation. Isotopes. Radiomimetics. Practical aspects of radiation. Appendixes: glossary of terms; mathematical considerations (exponents and logarithms); isotope statistics (half-lives, energies, etc.); RBE values; current maximum permissible exposure levels.

■ RADIOBIOLOGY OF CULTURED, MAMMALIAN CELLS

By Mortimer M. Elkind, National Institutes of Health, and Gordon F. Whitmore, University of Toronto.

Estimated date of publication: summer of 1966.

A book that will supply a didactic base for the student and a critical review for the active researcher. It develops and reviews the principal radiobiological topics that have been examined with cultured mammalian cells. For this to be done in a logical fashion, work has been drawn from bacteria, yeasts, and plants and the discussion extended to *in vivo* assay systems.

CONTENTS: Introduction. Cell culture techniques. Survival curve theory. *In vitro* survival curves. *In vivo* survival curves. Influence of chemical and physical factors on survival. Recovery processes related to survival. Effects of radiation on division and growth. Cytogenetic studies with irradiated cells. Biochemical effects of radiation.

■ SPACE RADIATION BIOLOGY

By Cornelius A. Tobias and Paul W. Todd, Donner Laboratory, University of California.

Estimated date of publication: summer of 1966.

A book for the biologist interested in learning about the radiation effects of space on life processes.

CONTENTS: Part A: Space Radiation Physics. Stellar physics. Solar radiation. Intergalactic radiation. Relevant interactions of radiation. Radiation chemistry of the upper atmosphere. Space radiations as observed from earth. Dosimetry of ionizing space radiations. Part B: Space Radiation Biology. Light and life. Chemical and organic evolution. Planetary atmospheres and life. Relevant principles of radiobiology. Effects of densely ionizing radiations on micromolecules and microorganisms. Effects of densely ionizing radiation on mammalian cells. Physiological effects of densely ionizing radiation. Radiological physics in astronautics.

CHEMISTRY

■ DECONTAMINATION OF NUCLEAR REACTORS AND EQUIPMENT

Edited by J. A. Ayres, Pacific Northwest Laboratory.

Estimated date of publication: summer of 1966.

A summarization of the available research and development information on the radioactive decontamination of nuclear reactors and associated equipment, "decontamination" being the removal of radioactivity from surfaces that have become "contaminated" with adhering radioactivity. Contributors are from a number of active sites in the United States, England, Canada, and France. Audience for this book will be technical or management personnel who either design or operate reactors or who might be in the primary business of radioactive decontamination. Much of the content will, however, provide useful information to anyone who, in handling radioactive materials, spills them and is faced with the subsequent problem of decontamination.

CONTENTS: Section I: Introduction. Background. The contamination problem. Minimizing the contamination problem. Review of decontamination effort. Section II: Chemical and Physical Aspects. Contamination and film formation. Decontamination and film removal. Corrosion. Section III: Evaluation. Testing procedures. Significance of variables. Section IV: Decontamination of Reactors. Low-temperature water-cooled reactors. Pressurized-water reactors. Boiling-water reactors. Gas-cooled and other reactor systems. Section V: Decontamination of Equipment. Buildings and laboratories. Process equipment. Decontamination from widespread release. Section VI: Special Topics in Decontamination. Design. Planning the decontamination operation. Decontamination fluids disposal. Safety. Section VII: Status of Decontamination Tech-

nology. Future studies. Appendixes: decontamination products; commercial compounds; commercial equipment.

■ TEXTBOOK OF RADIATION CHEMISTRY

By E. J. Henley, Stevens Institute of Technology, and E. R. Johnson, U. S. Bureau of Standards.

Estimated date of publication: fall of 1966.

A textbook that proposes to expose the underlying scientific principles of radiation chemistry, describing aspects of the sciences that are unique to the field of radiation chemistry. This book will contain approximately 400 pages. It is written for the advanced undergraduate and graduate students. It will be self-contained in that it may be read and understood in its entirety by a chemist or chemical engineer with no previous knowledge of radiation chemistry or atomic physics.

CONTENTS: Introduction. Absorption of radiation by matter. Radiation sources. Radiation dosimetry. Chemical consequences of the absorption of high energy radiation. Modern techniques in radiation chemistry. Radiation chemistry of gases. Radiation chemistry of the condensed phases. Radiation chemistry of liquid hydrocarbons. Radiation effects on solids. Industrial applications.

ENGINEERING

■ APPLIED RADIATION PROTECTION AND CONTROL

By Joseph J. Fitzgerald, Francis J. Mahoney, and Gordon L. Brownell, Iso/Serve, Inc.

Estimated date of publication by Gordon and Breach: fall of 1966.

This book will consist of the development and discussions of the criteria and design specifications for the engineering of safety into programs where sources of ionizing radiation are used. The text is intended for graduate school science and engineering students, especially health physicists and radiological engineers.

CONTENTS: Introduction to applied radiation protection and control. Formulation of a radiation protection and control program. Criteria for the selection and use of radiation instruments. Specifications for methods in and results of the calibration and use of radiation-detection and -measuring equipment. Criteria for and analyses of air and water samples. Radiation protection and control design aspects of nuclear facilities. Reactor safeguards and nuclear-safety problems. Radioactive-waste management. Emergency planning considerations. Radiation-instrument response-exposure formulas. Radiation-dosimetry formulas. Radiation protection and control guides. Index.

■ ENGINEERING FOR NUCLEAR FUEL REPROCESSING

By J. T. Long, Chemical Technology Division, Oak Ridge National Laboratory.
Estimated date of publication by Gordon and Breach: summer of 1966.

A book that will present those facets of chemical engineering peculiar to the reprocessing of spent nuclear-reactor fuels. Emphasis will be placed on the technology proved successful in operating plants. From the book, both first-year graduate students and practicing engineers will be able to gain a broad understanding of the subject area. Also they will be able to gain a useful perspective in understanding how competing processes and methods relate with respect to their levels of development and their future possibilities.

This book will combine in useful form the AEC's production experience with a large stock of research and development information. Numerous data and extensive know-how, until now buried in files or in the minds of engineers too busy to publish them, or scattered about in reports and periodicals, will be brought to light. This volume should be useful to both chemical engineers, in or out of the nuclear-fuel-reprocessing field, and students having an interest in the subject areas of solvent extraction, ion exchange, distillation, and other mass-diffusion operations, particularly where remote operation and control are utilized. This book will discuss the special considerations required in the design of fluid flow, heat-transfer, and instrumentation aspects of radioactive-chemical-processing systems. Chapters on plant design, plant operation, and fuel-processing economics will be included. This book will contain about 900 pages.

■ REMOTE HANDLING OF MOBILE NUCLEAR SYSTEMS

By D. C. Layman and G. Thornton, Nuclear Materials and Propulsion Operation, General Electric Company; formerly associated with the terminated Aircraft Nuclear Propulsion Department, General Electric Company.
Estimated date of publication by USAEC: winter of 1965-1966.

A book on remote handling which will survey and report the significantly useful information and experience developed by GE-ANP to remotely service and maintain their direct-air-cycle nuclear systems. This book will contain about 730 pages. It will be for use by engineers now actively engaged in the design or operation of remote-handling facilities. Tech-

niques, methods, hardware, and a unique philosophy will be described. These are expected to be useful to engineers in other fields in the operation of remote-handling facilities, especially those handling heavy equipment in hot cells.

CONTENTS: Remote handling at the Idaho Test Station. Remote-handling procedures and support equipment. General-purpose facilities and tools. Facilities and equipment in the shop building. Related services. Mechanical design. Nuclear design. Radiation effects. Health physics. Appendixes: specification for a hot shop wall-mounted boom and manipulator; design specification for radioactive core service area wall-mounted boom; purchase specification for a remotely handled electric connector; methods of calculating induced activity; sample calculations.

METALLURGY

■ METAL HYDRIDES

By William M. Mueller and James P. Blackledge, Denver Research Institute, University of Denver.
Estimated date of publication: fall of 1966.

A presentation of the theory of metal hydride formation and a compilation of the status of today's knowledge of metal hydrides from the metallurgists' viewpoint. Emphasis is on the theory and information pertinent to nuclear energy applications.

CONTENTS: The nature of hydrides. Hydrides in nuclear reactor applications. The thermodynamics of metal-hydrogen systems. Statistical mechanics of metal-hydrogen systems. Chemistry and preparation of the hydrides. Saline hydrides. Zirconium hydride and hafnium hydride. Titanium hydride and scandium hydride. Yttrium hydride. The rare-earth hydrides. The actinide hydrides. Other metal hydrides. Fabrication of hydrides. Index.

■ PLUTONIUM HANDBOOK: A GUIDE TO THE TECHNOLOGY

Edited by O. J. Wick, Pacific Northwest Laboratory.
Estimated date of publication by Gordon and Breach: winter of 1965-1966.

A comprehensive descriptive report of the physics, chemistry, chemical processing, metallurgy, fabrication, utilization, analysis, and hygienic aspects of plutonium and its alloys, with emphasis on the technology of producing and using these materials. This book will contain about 1350 pages.

CONTENTS: Section I: Physics. Properties of plutonium isotopes. Nuclear reactions. Section II: Metallurgy. Physical properties. Mechanical properties. Metallurgical properties. Corrosion and oxidation. Alloying behavior of plutonium. Pluto-

nium refractory compounds. Metallography. Laboratory techniques. Section III: Chemistry of Plutonium. Chemical principles. Compounds of plutonium. Solution chemistry of plutonium. Section IV: Chemical Processing of Plutonium. Separation from irradiated uranium. Plutonium conversion processes. Plutonium recovery and waste disposal. Section V: Fabrication and Utilization of Plutonium and Alloys. Unalloyed plutonium and plutonium-base alloys. Plutonium metallic fuels. Plutonium ceramic fuel fabrication. Irradiation behavior of plutonium fuels. Section VI: Analysis and Inspection Methods. Analysis. Inspection. Section VII: Health and Safety. Biological factors. Controlling and evaluating plutonium deposition. Factors in controlling personnel exposure to radiations from plutonium—external sources. Design of equipment and facilities. Nuclear safety and criticality of plutonium. Radiochemical determination of plutonium for radiological purposes.

PHYSICS

■ ELECTROMAGNETIC RADIATION AND ANTENNAS

By C. W. Harrison, Jr., Sandia Corporation, and R. W. P. King, Harvard University.

Estimated date of publication: spring of 1966.

A book that will serve as a reference for engineers working in communications and with the control of space vehicles and missiles. It will be valuable to radio engineers and physicists concerned with antenna theory and electromagnetic radiation for various applications. Also it will be useful as a text for first-year graduate-level study in radio engineering and physics.

CONTENTS: General theory. Introduction to theory of plasmas. Cylindrical antenna in a dissipative medium. Electromagnetic field of a dipole. Coupled dipoles and folded dipoles. Electromagnetic fields of simple arrays. Transmission-line theory and transmission-line antennas. Special antennas. The receiving antenna in a dissipative medium. The circular-loop antenna. The receiving loop. Electromagnetic shielding. Coupled dipoles and slots.

■ INTERACTION OF RADIATION WITH MATTER

By A. H. Foderaro, Pennsylvania State University.

Estimated date of publication: summer of 1967.

This book will be an introductory text on the classical, quantum mechanical, and nuclear theory underlying the principles employed to solve problems in the interaction of radiation with matter. The book can be used to prepare the first-year nuclear engineering graduate student for courses in practical applications

such as reactor core design, shielding, and radiation effects. It is also intended for engineers and scientists seeking to understand the theoretical basis for radiation shielding design, reactor core design, and radiation damage in materials for general nuclear applications and space vehicles. An understanding of the interaction process, including energetics and cross sections, is fundamental to further study or work in nuclear physics and engineering.

CONTENTS: Introduction. Background. Neutron interactions. Photon interactions. Appendix for notations and constants. Appendix for atomic mass table. Index.

■ MATHEMATICAL THEORY OF RADIATION DOSIMETRY

By Joseph J. Fitzgerald, Iso/Serve, Inc.

Estimated date of publication by Gordon and Breach: spring of 1966.

A book that will fill the need for a text in mathematical techniques for the training of health physicists. It will also serve as a reference book in dosimetry computations for practicing health physicists, meteorologists, and radiological engineers.

CONTENTS: Introduction to the mathematical theory of radiation dosimetry. Summary of pertinent radiation physics. Summary of pertinent radiation biology. Interaction of gamma radiation with matter. Gamma-radiation dosimetry. Interaction of neutron radiation with matter. Neutron-radiation dosimetry. Beta-radiation dosimetry. High-energy and heavy-charged-particle dosimetry. Background material for internal-radiation dosimetry. Radiation dosimetry of internal emitters.

■ NEUTRON THERMALIZATION

By M. S. Nelkin, D. E. Parks, and N. F. Wikner, General Atomic.

Estimated date of publication: fall of 1966.

A book primarily intended for people interested in reactor-design physics, for specialists in the field of thermalization, and for teachers and students at the graduate levels of nuclear science and engineering. The book will provide a systematic exposition of the theory and measurement of thermal-neutron spectra and of the relevance of neutron thermalization for problems of reactor-design physics.

CONTENTS: Introduction. The theory of slow-neutron scattering. Neutron scattering in moderators. Thermal-neutron transport theory. Slow-neutron spectrum in a homogeneous medium. Measurement of thermal-neutron spectrum. Interpretation of thermal-neutron-spectrum measurements. Effects

of chemical breeding on nuclear reactor design physics. Diffusion lengths and decay time. Thermalization effects in heterogeneous media. Index.

■ NUCLEAR PHYSICS

By J. S. Levinger, AVCO Visiting Professor, Cornell University.

Estimated date of publication by Scholastic Book Services: spring of 1966.

A book to provide resource literature to stimulate interests in and to sharpen understanding of nuclear science at the junior and senior high-school level. Prepared under the joint sponsorship of the AEC and the National Science Teachers Association, this paperback publication will be published as one of the Vistas of Science series.

CONTENTS: Different forms of energy. Protons, neutrons, and nuclei. Mass and energy. Laboratory studies of nuclei. Fusion, fission, and other reactions. Nuclear reaction rates. Problems in nuclear physics. Activity section. Appendixes. Glossary. Annotated list of selected readings. Index.

■ THERMIONIC CONVERSION: ELEMENTS, SCIENCE AND ENGINEERING

Edited by N. S. Rasor, G. N. Hatsopoulos, and R. J. Harvey, Thermo Electron Engineering Corporation.

Estimated date of publication: winter of 1966-1967.

A book that covers thermionic conversion from theory through practice. It is intended to introduce technical people to thermionics, to review the status of this branch of energy conversion, and to serve as reference for the design of components and systems for the direct conversion of nuclear and other forms of heat energy to electric energy. The book will be suitable as a textbook for an advanced undergraduate engineering course and will be useful to senior technical personnel entering or actively participating in the field.

CONTENTS: Elements of thermionic conversion, including basic processes, ideal converter performance, vacuum converter, vapor or plasma converter. Science of basic processes, including thermodynamics of electronic and plasma physics. Converter and system engineering, including converter design and component technology, converter testing and performance mapping, system integration considerations, solar generator, radioisotope generator, thermionic nuclear reactor system, combustion-heated generators.

REACTORS

■ FAST REACTOR TECHNOLOGY—PLANT DESIGN

Edited by John Yevick, Atomic Power Development Associates, Inc.

Estimated date of publication by Massachusetts Institute of Technology Press: spring of 1966.

A presentation of the present technology of all aspects of fast reactors. Emphasis is on the Enrico Fermi Atomic Power Plant; however, technology of all fast reactors is included.

CONTENTS: Introduction to fast reactors. Coolant properties, heat transfer, and fluid flow of liquid metals. Structural analysis. Heat transport systems. Steam electric plant. Plant structure, containment design, and site criteria. Fuel handling. Shielding. Plant instrumentation and control. Economics. Fast reactors. Index.

■ NUCLEAR POWER PLANT DESIGN ANALYSIS

By Alexander Sesonske, Purdue University.

Estimated date of publication: fall of 1967.

A textbook of approximately 600 pages for the advanced graduate nuclear engineering student to impart the fundamentals needed for nuclear-power-plant design and evaluation. Important technical and economic parameters of various reactor systems will be described and inter-related. This book should serve as a guide in developing a preliminary reactor design and be useful in providing background for the subsequent design phases.

CONTENTS: Introduction. Nuclear plant economics. Thermal transport systems. Neutronic and control parameters. Fuel utilization and fuel-cycle parameters. Reactor plant evaluation. Design optimization approaches.

■ NUCLEAR REACTOR SHIELDING

By Samuel Glasstone, consultant to the USAEC, and Norman M. Schaeffer, Radiation Research Associates, Inc.

Estimated date of publication: fall of 1967.

A book on the subject of design of nuclear-reactor shields. The text, primarily for nuclear engineers and advanced graduate students, will contain general and specific information on techniques currently used in shield analysis. Mathematical models and machine techniques will be treated in depth.

CONTENTS: General principles. Methods of calculation of the spatial distributions of neutrons and

photons. Heat-generation analysis. Coolant-system shielding. Spent-fuel shielding problems. Streaming and scattering of radiation. Radiation effects. Materials used in reactor shielding. Special problems. Glossary. Index.

■ PLUTONIUM FUEL CYCLES—THERMAL REACTORS

By Eugene A. Eschbach and Peter L. Hofmann, Pacific Northwest Laboratory.

Estimated date of publication: 1967.

A study of the isotopic transformation nuclear fuel undergoes while being irradiated in a reactor and the effect of the isotopic changes upon the changing physics characteristics of the reactor.

CONTENTS: Scope of plutonium-fuel-cycle studies. Nuclear characteristics of fissile and fertile isotopes. Physics of plutonium for thermal reactors. Long-term reactivity effects with fuel burnup. Fuel-burnup experiments: Methods and results. Fuel-burnup calculations: Use of digital codes. Fuel costs, fuel value, and fuel conservation. Fuel management and cycle-reactor matching. Plutonium recycle. Plutonium fuel cycles for compact, thermal reactors. Utilization of mixed fertile-fissile fuel linkages. Combined fast-thermal fuel cycles. Fission-product and transuranium isotope recovery: Potential impact on fuel-cycle economics.

■ REACTOR EXPERIMENTS HANDBOOK

Edited by Raymond L. Murray, University of North Carolina.

Estimated date of publication: spring of 1968.

A comprehensive manual-text-handbook on experiments in nuclear science and engineering, to assist in laboratory training and aimed at providing understanding of reactor behavior and research utilization of the reactor and its by-products.

CONTENTS: Category I: Preliminary measurements. Category II: Reactor physics and neutron diffusion. Category III: Reactor technology. Category IV: Reactor kinetics and control. Category V: Radiation research. Category VI: Radiation hazards and protection. Category VII: General.

■ THERMAL STRESS TECHNIQUES IN THE NUCLEAR INDUSTRY

By Zenons Zudans, Tsi Chu Yen, and William H. Steigelmann, The Franklin Institute.

Estimated date of publication by American Elsevier Publishing Co.: summer of 1965. Estimated cost: \$20.00.

The authors have extracted facts and theories from several arts which are necessary for handling thermal stress problems. Presents a basic discussion to impart the background information, the applicable equations to serve as tools for the solutions of problems, and examples to underscore the methods of application. The approach is practical and applies to hardware used in nuclear reactors.

CONTENTS: The nuclear power plant. Heat transfer. Thermoelectricity. Analysis of creep and thermal fatigue. Analysis of axisymmetrical structures. Application to plant components. Appendixes.

VACUUM TECHNOLOGY

■ PRACTICAL VACUUM TECHNIQUES

By W. F. Brunner, Jr., and Thomas Batzer, Lawrence Radiation Laboratory, University of California.

Estimated date of publication by Reinhold Publishing Corp.: summer of 1965.

Estimated cost: \$9.00.

A basic manual on the construction, operation, and maintenance of modern high-vacuum systems. This book will be written to train and instruct vacuum technicians, both on the job and in the technological college. Craftsmen in this field also will find this book usefully instructive. The technical level, including the first chapter on theoretical background material, will be directed toward the intelligent, technically orientated, high-school graduate. No college background will be assumed.

Vacuum work is an integral and large part of the very important controlled-thermonuclear research program sponsored by the AEC at several laboratories. Vacuum work also enters into other major AEC programs and, indeed, is essential at any large research laboratory. In addition to being of value at AEC installations, the book will find much larger use in industry and at other government laboratories. Industries which make considerable use of vacuum technology and have constant training problems in this area include food processing, electron-tube manufacture, metallurgy, and vacuum coating. In the government's space program, operating large vacuum chambers to simulate upper atmosphere conditions is another area where the book will fill a need. The book will contain about 225 pages.

CONTENTS: The behavior of gases. The components of a vacuum system. Techniques and procedures. Ultrahigh vacuum. Properties of materials used in vacuum systems. Glossary. Appendixes.

PART 3

Technical Monographs in Preparation

BIOLOGY AND MEDICINE

■ AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES MONOGRAPHS

The American Institute of Biological Sciences is preparing for the AEC a continuing series of monographs on biological subjects of interest and importance to the utilization of nuclear energy for peaceful purposes. These monographs are being written under the supervision of John R. Olive, Executive Director, American Institute of Biological Sciences.

An advisory committee, headed by Austin M. Brues, consists of

Leo K. Bustad, Pacific Northwest Laboratory, Richland, Washington.

Ernest Pollard, Pennsylvania State University, University Park, Pa.

Charles W. Shilling, Biological Science Communications Project, Washington, D. C.

Titles and authors already selected and estimated dates of publication are

1. LIGHT, PHYSICAL AND BIOLOGICAL ACTIONS, H. H. Seliger and W. D. McElroy, Johns Hopkins University, Baltimore, Md., Academic Press, 1965. 417 pp., 121 illus., $6\frac{1}{4} \times 9\frac{1}{4}$, \$12.00. (Published after this booklet was prepared for publication.)
2. MAMMALIAN RADIATION LETHALITY: A DISTURBANCE IN CELLULAR KINETICS, V. P. Bond, J. Archambeau, and T. Fliedner, Brookhaven National Laboratory, Upton, Long Island, N. Y., summer of 1965.
3. IONIZING RADIATION—NEURAL FUNCTION AND BEHAVIOR, D. J. Kimeldorf and E. L. Hunt, U. S. Naval Radiological Defense Laboratory, San Francisco, Calif., summer of 1965.
4. TRANSPLANT IMMUNITY AND RADIATION, J. F. Loutit and H. S. Micklem, Medical Research Council, Harwell, fall of 1965.
5. TRITIUM IN BIOLOGY, Ludwig E. Feinendegen, Services de Biologie, Euratom, Brussels, spring of 1966.
6. PHYSICAL ASPECTS OF RADIOISOTOPES IN THE HUMAN BODY, F. W. Spiers, University of Leeds, spring of 1966.
7. MUTAGENESIS, I. I. Oster, Institute of Cancer Research, Philadelphia, Pa., summer of 1965.
8. SOIL—PLANT SYSTEMS: Maurice Fried, International Atomic Energy Agency, Vienna, fall of 1965.

CHEMISTRY AND CHEMICAL ENGINEERING

■ AMERICAN CHEMICAL SOCIETY

The American Chemical Society (ACS) is preparing three monographs for the AEC on chemistry and chemical engineering subjects that are of interest and importance to the utilization of nuclear energy for peaceful purposes. These monographs are being written under the supervision of Robert F. Gould, Director of Editorial Research, ACS.

An advisory committee, headed by Robert F. Gould, consists of

- R. W. Dodson, Brookhaven National Laboratory, Upton, Long Island, N. Y.
- J. J. Katz, Argonne National Laboratory, Argonne, Ill.
- I. Perlman, University of California, Berkeley, Calif.
- F. H. Spedding, Iowa State University, Ames, Iowa.
- E. H. Taylor, Oak Ridge National Laboratory, Oak Ridge, Tenn.
- T. I. Taylor, Columbia University, New York, N. Y.

Titles and principal authors already selected and estimated dates of publication are

1. METAL HEXAFLUORIDES, Bernard Weinstock, Scientific Laboratory, Ford Motor Co., Dearborn, Mich., fall of 1965.
2. PULSED RADIOLYSIS, Max Matheson, Argonne National Laboratory, Argonne, Ill., fall of 1965.
3. SOLVENT EXTRACTION OF INORGANIC COMPOUNDS, Richard M. Diamond, University of California, Berkeley, Calif., spring of 1966.

INDUSTRIAL HYGIENE

■ AMERICAN INDUSTRIAL HYGIENE ASSOCIATION MONOGRAPHS

The American Industrial Hygiene Association (AIHA) is preparing for the AEC six monographs on industrial hygiene subjects of interest and importance to the utilization of nuclear energy for peaceful purposes. These are being written under the supervision of George D. Clayton, Executive Secretary, AIHA, and William E. McCormick, Past President, AIHA.

An advisory committee, No. 1, headed by George D. Clayton, Executive Secretary, AIHA, consists of

- Edgar C. Barnes, Westinghouse Electric Corp., Pittsburgh, Pa.
- Norton Nelson, New York University, Medical Center, New York, N. Y.
- J. C. Radcliffe, Ford Motor Company, Dearborn, Mich.
- Harry F. Schulte, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.
- James Sterner, Eastman Kodak Company, Rochester, N. Y.
- Charles R. Williams, Liberty Mutual Insurance Company, Boston, Mass.

Titles and principal authors already selected and estimated dates of publication are

1. BERYLLIUM—ITS INDUSTRIAL HYGIENE ASPECTS, H. E. Stokinger *et al.*, U.S. Public Health Service, Cincinnati, Ohio, fall of 1965.
2. PARTICLE SIZE ANALYSIS IN INDUSTRIAL HYGIENE, Leslie Silverman *et al.*, Harvard School of Public Health, Boston, Mass., fall of 1965.

An advisory committee, No. 2, headed by William E. McCormick, Past President, AIHA, consists of

- William G. Hazard, Owens-Illinois Glass Company, Toledo, Ohio.
- Thomas L. Shipman, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.
- Edgar C. Barnes, Norton Nelson, and George D. Clayton are also on this committee.

Titles and principal authors already selected and estimated dates of publication are

3. THORIUM—ITS INDUSTRIAL HYGIENE ASPECTS, Roy E. Albert, New York University, Medical Center, New York, N. Y., fall of 1965.
4. URANIUM—ITS INDUSTRIAL HYGIENE ASPECTS, Joseph A. Quigley *et al.*, National Lead Company of Ohio, Cincinnati, Ohio, spring of 1966.
5. I-131—ITS INDUSTRIAL HYGIENE ASPECTS, Leo K. Bustad *et al.*, Pacific Northwest Laboratory, Richland, Wash., spring of 1966.
6. PLUTONIUM—ITS INDUSTRIAL HYGIENE ASPECTS (author to be selected), spring of 1966.

METALLURGY

■ AMERICAN SOCIETY FOR METALS MONOGRAPHS

The American Society for Metals (ASM) is preparing for the AEC five monographs on metals, metal-like substances, or metallurgical operations of interest and importance to the utilization of nuclear energy for peaceful purposes. These are being written under the direction of Allen G. Gray, Editor, Periodical Publications, ASM.

An advisory committee, headed by Allen G. Gray, consists of

- H. H. Chiswick, Argonne National Laboratory, Argonne, Ill.
- H. S. Kalish, United Nuclear Corp., New Haven, Conn.
- E. B. LaVelle, General Electric Company, Richland, Wash.
- W. E. Ray, Westinghouse Electric Corp., Cheswick, Pa.
- M. A. Scheil, A. O. Smith Corp., Milwaukee, Wis.
- J. S. Theilacker, Westinghouse Electric Corp., Cheswick, Pa.

Titles and authors already selected and estimated dates of publication are

1. STRESS-CORROSION CRACKING OF STEEL, Norman A. Nielsen, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., fall of 1966.
2. CERAMIC FUEL ELEMENTS, Robert B. Holden, United Nuclear Corporation, New Haven, Conn., fall of 1965.
3. FABRICATION OF REFRACTORY METALS, James F. Schumar and Ross Mayfield, Argonne National Laboratory, Lemont, Ill., fall of 1965.
4. ADVANCED METALWORKING PROCESSES, E. C. Bishop and F. L. Orrell, Jr., spring of 1966.
5. DISPERSION TYPE FUEL ELEMENTS, A. N. Holden, General Electric Company, Pleasanton, Calif., spring of 1966.

REACTORS

■ AMERICAN NUCLEAR SOCIETY MONOGRAPHS

The American Nuclear Society (ANS) is currently preparing six monographs for the AEC

in areas of reactor technology of importance to the utilization of nuclear energy for peaceful purposes.

An advisory committee consists of

- Everitt P. Blizard, Oak Ridge National Laboratory, Oak Ridge, Tenn.
- Frank G. Foote, Argonne National Laboratory, Argonne, Ill.
- Lewis G. Stang, Jr., Head, Hot Laboratory Division, Brookhaven National Laboratory, Upton, N. Y.
- Warren P. Chernock, Assistant Manager, Nuclear Laboratories, Combustion Engineering, Inc., Windsor, Conn.
- Lester L. Kintner, Supervisor, Thermal and Hydraulics Section, Allis Chalmers Atomic Energy Division, Bethesda, Md.

Titles and authors already selected and estimated dates of publication are

1. ALKALI METAL HANDLING AND SYSTEM OPERATING TECHNIQUES, J. W. Mausteller, S. J. Rodgers, and F. Tepper, MSA Research Corporation, Callery, Pa., summer of 1965.
2. NONDESTRUCTIVE FUEL ASSAY, Warren J. McGonnagle, Southwest Research Institute, San Antonio, Tex., winter of 1966.
3. FUNDAMENTALS OF THE NEUTRON TRANSPORT THEORY, R. K. Osborn, University of Michigan, and S. Yip, Cornell University, summer of 1965.
4. IRRADIATION BEHAVIOR OF NUCLEAR FUELS, J. A. L. Robertson, Atomic Energy of Canada Limited, Chalk River, Ontario, Canada, spring of 1966.
5. COOLANT CHEMICAL TECHNOLOGY OF AQUEOUS HETEROGENEOUS REACTOR SYSTEMS, P. Cohen, Westinghouse Atomic Power Department, Westinghouse Electric Corporation, Pittsburgh, Pa., fall of 1965.
6. FUEL ELEMENTS IN OPERATIONAL NUCLEAR POWER REACTORS, M. Simnad, General Atomic, San Diego, Calif., spring of 1966.

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- Academic Press Inc.
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New York 3, New York
- Addison-Wesley Publishing Company, Inc.
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- American Society for Metals
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- Clearinghouse for Federal Scientific and
Technical Information
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U. S. Department of Commerce
Springfield, Virginia 22151
- Dover Publications, Inc.
180 Varick Street
New York 14, New York
- Gordon and Breach
Science Publishers, Inc.
150 Fifth Avenue
New York, New York 10011
- Interscience Publishers, Inc.
605 Third Avenue
New York, New York 10016
- The Macmillan Company
60 Fifth Avenue
New York, New York 10011
- Massachusetts Institute of Technology Press
Cambridge, Massachusetts 02142
- McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, New York 10036
- Pennsylvania State University Press
University Park, Pennsylvania
- Reinhold Publishing Corporation
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New York, New York 10022
- Rowman and Littlefield, Inc.
84 Fifth Avenue
New York 11, New York
- W. B. Saunders Company
W. Washington Square
Philadelphia 5, Pennsylvania
- Scholastic Book Services
50 West 44th Street
New York 36, New York
- Superintendent of Documents
U. S. Government Printing Office
Washington, D. C. 20402
- University of Chicago Press
5750 Ellis Avenue
Chicago, Illinois 60637
- University Microfilms, Inc.
313 North First Street
Ann Arbor, Michigan 48107
- D. Van Nostrand Company, Inc.
120 Alexander Street
Princeton, New Jersey
- John Wiley & Sons, Inc.
605 Third Avenue
New York, New York 10016

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- ABBOTT, Lorraine S., and E. P. Blizard (Eds.), Reactor Handbook (2nd edition), Volume III: Physics and Shielding, Part B: Shielding, p. 36.
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